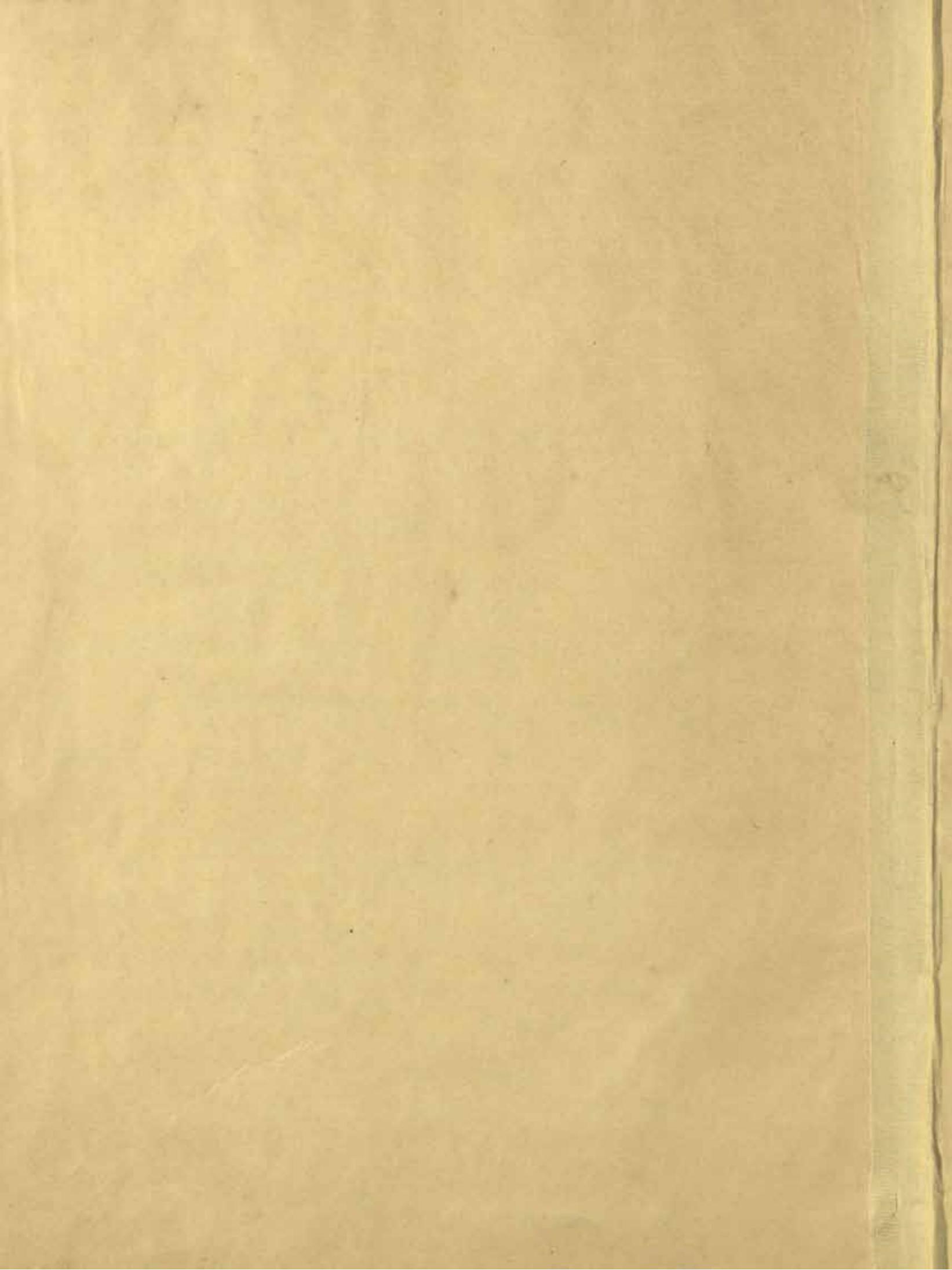


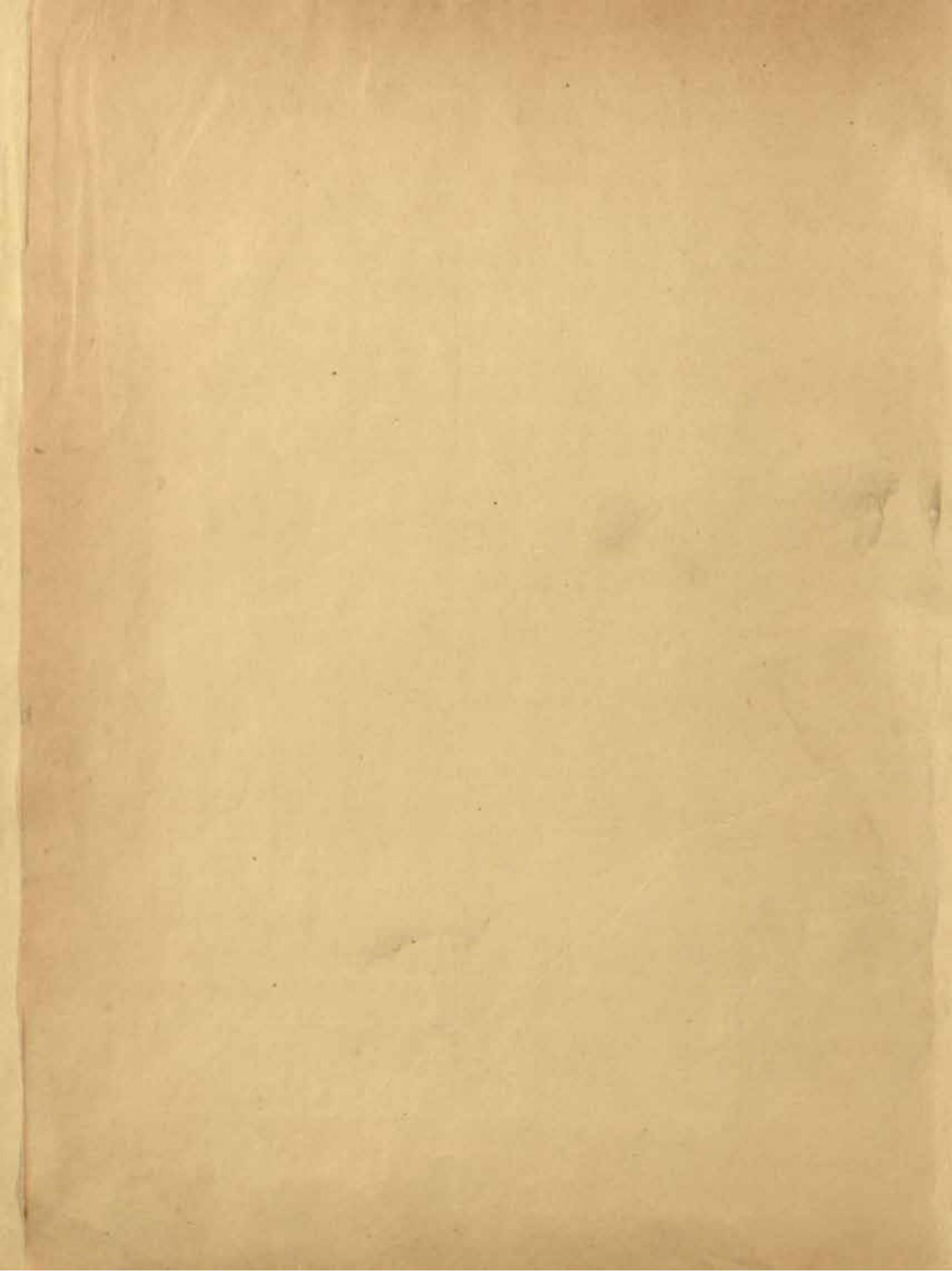
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Origins & ethnographical significance of Indian boat designs

by

J. Hornell

INDIAN BOAT

DESIGN.

BY

J. HORNELL

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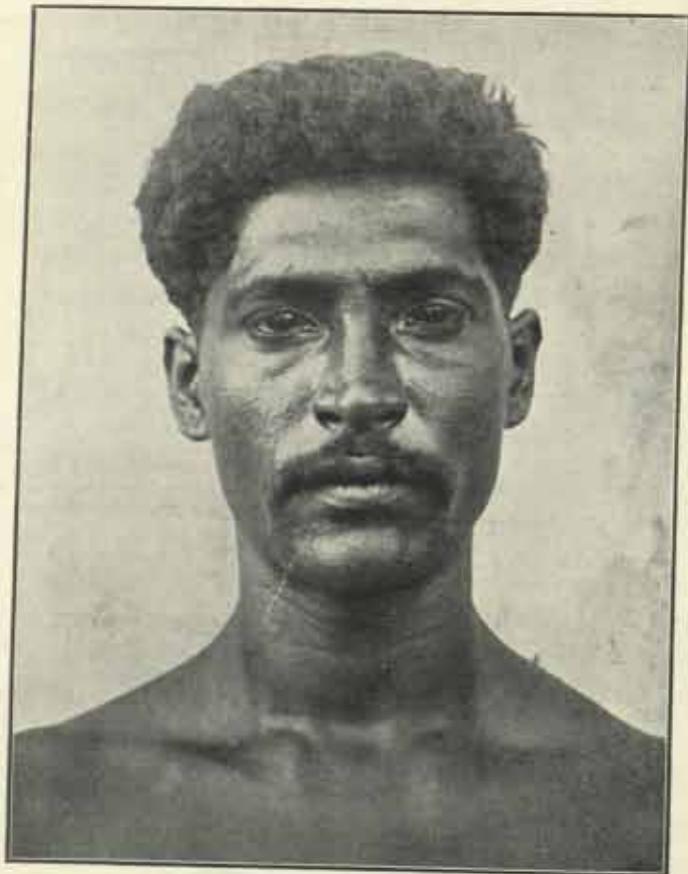


Fig. 1. A Parawa Fisherman of Tuticorin showing Polynesian type of features.



Fig. 2. Stern view of two Ganges cargo-boats, clinker-built ; rudder of balanced type. Benares.

Title

3

*The Origins and Ethnological Significance of Indian Boat Designs.¹*By JAMES HORNELL, Director of Fisheries, Madras Government.

[With Plates I—VI.]

PART I.—BOAT TYPES NOW EXISTING IN INDIA.

During recent years several ethnologists have endeavoured to adduce evidence of the spread and penetration of ancient Mediterranean culture by sea along definite trade routes from the Red Sea to India, thence eastwards to the myriad islands of the Malay Archipelago and the Pacific and onwards to the American continent itself. A great diversity of customs and many domestic articles of utility or ornament have been examined to see how far they bear out this hypothesis. The enquiry from which originated the following essay, was commenced with a view to see what light an examination of the main types of sea and river craft found in India at the present day would shed upon this theory of a cultural world drift from west to east. The investigation had not proceeded far when it became apparent that a greater and far more important problem was involved and that a careful study of what had appeared at the beginning as disconnected and unimportant facts was capable of throwing much needed illumination upon a hitherto unknown phase of the race problems of India.

One of the earliest facts we ascertain when investigating the designs of Indian coast craft is the correlation of particular designs with definite regions on the coast line characterised by some clearly marked physical features and usually also by racial divergence. The amount of overlapping is comparatively insignificant and from all we can see the prevalent designs of fishing craft are the same now in each region as they were hundreds of years ago. Only in the larger coasting craft do we find evidence of considerable recent change in design.

The coast and island regions distinguished by characteristic boat types are as follows:—

- (a) The North-West Coast, comprising Baluchistan, Sind, Kutch and Kathiawar,
- (b) The Bombay Coast southward to Mangalore,
- (c) Malabar and Travancore,
- (d) The Gulf of Mannar,
- (e) Palk Bay and Strait,
- (f) The East Coast northwards of Point Calimere,
- (g) The Maldive and Laccadive Islands.
- (h) The Andaman and Nicobar Islands.

¹ Read in abstract at the Lahore Meeting of the Indian Science Congress, January 1918.

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Each of these regions has its own boat types, its own characteristics in weather, climate and coast formation. In frequent cases characteristic boat types are co-extensive in range with the limits of race and language or the influence of foreign sea-trade. The North-West Coast is arid and stony, with physical and climatic conditions closely approximating to those of Arabia and, as we shall see, Arab boat designs are dominant and characteristic. In Bombay itself we get the same types mingled with others truly Indian in origin, but southward in the much indented coast, moist and well wooded, that stretches to Goa and Mangalore, we find Arab influence ousted by indigenous and Polynesian types, but reviving partially in Malabar where though the Malayali adheres to the indigenous dug-out design, the Arab type is largely built at those Mappilla centres where the strain of Arab blood is appreciable, as for example at Calicut, Beypore and Ponnani.

Turning Cape Comorin we find that Polynesian and indigenous types have held their own successfully against the Arab. The former influence at the present day is found best developed on the Ceylon side among the Sinhalese; in India it is seen in strength in the north-west corner of the Gulf of Mannar and universally in Palk Bay and Strait; elsewhere on this section of the Indian coast indigenous designs of catamaran and canoe are well-marked and unusual.

Northward of Point Calimere is the real home of the catamaran, a truly Indian type, specialized for use upon the surf-beaten Coromandel and northern Telugu coasts where the catamaran and masula boat must continue to hold their own wherever there be no harbours of refuge, such as Madras and Cocanada.

In Bengal the smaller coast craft have little importance, the types seen being really varieties of Ganges dinghis and of dug-out canoes, whilst in Burma, Mongolian and Malay influence is paramount, modified in type by local conditions and the innate unskillfulness of the Burman in boatcraft.

River craft are types apart and throughout India are all very archaic in their general features, resembling ancient Egyptian and Mesopotamian types so closely that they vivify scenes on the Nile and the Tigris in the days of Rameses and Assurbanipal.

THE NORTH-WEST COAST.

Sailing along the Mekran coast, past the mouths of the Indus and thence past Kutch and Kathiawar to the Gulf of Cambay, the Arab voyager finds this coast but a continuation and outlier of his own arid sandy home-land; this has been the only land in India that the Arab has occupied even temporarily, Sind and the lower valley of the Indus having been occupied by the Arab Kasim early in the eighth century, though we have records of Arab naval raids on this coast as early as 636 A.D., only four years after the Prophet's death.

Although Arab domination in Sind and the adjacent lands was short-lived, trade with the Persian Gulf and the south of Arabia has existed from time immemorial, and it is therefore natural to find Arab influence exclusively dominant in boat and ship design everywhere along this coast. Whether in the great kotia, the Indian

sea-going sister of that handsome matron, the Red Sea and Persian Gulf *baggala*, or in the humbler *machwa* of the fisherman and in the coasters known as *nauris* and *dhangis*, several principal characteristics are seen. All hoist the Arab lateen; all lift to the long swell of their seas the great forereaching grab bow; all have a deep forefoot and a raking stern. The *machwa* is entirely open and undecked whereas the *kotia* and the *baggala* have a high castellated decked poop and a properly laid main deck.

The universal rig is the lateen, wider and stouter in form than the loftier and more elegant *felucca-lateen* of the Mediterranean. The true Arab pattern of cutting off the fore angle of the sail is followed, so that a short perpendicular edge or luff of several feet in length is given below the heel of the yard. The *baggalas*, *kotias*, *nauris*, *dhangis*, and some of the larger *machwas* have both main and mizzen masts; the former is a stout heavy spar stepped nearly amidships with a great rake forward to enable it to carry the weight of the heavily yarded sail in the right place. The mizzen is a much smaller spar with a less pronounced rake forwards. Of rigging there is remarkably little, usually only a forestay and a pair of stays on either side. The yard is hoisted by a stout halyard passing from the fore side through a sheave at the masthead with an enormous three-sheave wooden block stropped to the end. The purchase leads to another gigantic four-sheave block placed just in front of the poop, an arrangement identical with that used by the Egyptians in the rig of the great galleys that sailed on that wondrous voyage to Punt some 1,600 years before our era. Upon the *buggala* and the *kotia* as the aristocrats of these seas, the builders lavish much skill and care. Their high poops have the stern windows (the aft end being of that obliquely truncated form known to sailors as a raked transom stern) often highly ornamented with a considerable amount of conventional nautical carving—scrolls, rope designs and simple arabesques. The bottom, to about the water line, is sometimes coppered but generally is coated with a white pitch most characteristic of Arab ship finish, carried upwards in a wide sweep on either bow. Above this the hull and the poop superstructure are soaked and scoured with oil after every overhaul and to the eye (the nose should not be consulted) the rich red-brown colouring taken on after several applications is particularly pleasing. The bow is notably low and unobtrusive, and this taken in conjunction with the high poop is distinctly an antique combination of much significance. To see a great *kotia* foaming through the water with a fair wind, the sun lighting the great spread of white sail and red carved poop, is one of the prettiest sights in Eastern seas and one that instinctively heightens our respect for the race that has evolved the type, powerful and admirably fitted for deep-sea service.

At several of the larger ports of the North-West coast the building of *kotias* and *machwas* is an important industry, in spite of the fact that nearly all the timber has to be imported from the Malabar coast. Here are built the fine *kotias*, running from 50 to 80 feet in length and up to 150 tons in size, which trade with Cochin and Calicut to the south and as far as Zanzibar on the west. Constant and intimate traffic is carried on with the Persian Gulf and many of the vessels built in India are constructed to the order of Gulf Arabs or are sold eventually to them.

These trading craft are divided into numerous varieties by native seamen ; some by differences apparently so slight that the uninitiated has difficulty in appreciating them. The main source of trouble is that boats of essentially the same build are given different names dependent primarily on the race of the owner and signalized by divergence in small detail, usually of ornament. Thus the *baggala* and *gunjo* are the Arab forms of the Indian *kotia*, the Arab *boom* or *dhangi* the counterpart of the Indian *nauri*, while the Indian *batel* represents the Arab *sambuk*.

The *baggala* is usually built by Arabs in their own lands ; is two and even occasionally three-masted, fully decked, with a high poop, truncate stern with counter, rudder trunk and ornamented quarters. In size commonly between '300-400 tons, rarely reaching 500 tons' register.

The *kotia* is built in India for Indian owners ; in great measure it is the native craft of the coast of Kutch and Kathiawar. In appearance it approaches closely to the *baggala* type, being two-masted, with poop, carved square stern and quarters ; usually with a rudder trunk. In size it runs generally under 200 tons, but in spite of its smaller size it makes equally long voyages as its great relative, the *baggala*, often making round voyages from Katch Mandvi to Bombay, thence to Madagascar or the African coast, back to Bombay and on home.

Kotias are the oceanic tramps of Indian craft, willing to go wherever remunerative freight offers, be it Chittagong or Jeddah, Nossi Bé or Colombo. Often the better found are copper bottomed ; if not, they have the usual chunam and grease mixture applied to the under-water parts. They are built chiefly at Kutch Mandvi, and on the Kathiawar coast, but a fair number are built at Mangalore and Calicut.

From *baggalas* of equal size they are distinguished, as are so many of these Eastern crafts, by the distinctive ornament upon the stem-head. In the *baggala*, this consists of a bollard-shaped prolongation of the stem-post, encircled by carved rings and often surmounted by a short peg ; in *kotias* a striking ornament, the so-called "Parrot's head", forms a characteristic figure-head. This latter ornament is a very widely spread Indian *motif*, seen again in the *gunjo* and the *nauri*. The *gunja* or *gunjo* is an Arab-owned *kotia*, built for or transferred to an Arab port. The only recognisable difference is usually the form of the stem ornament ; the "Parrot's head" has been reduced to a geometrical circular disc with a curved bar on the aft side in place of the beak and with a crest-like ornament on top.

Last of all the square-sterned traders commonly seen on the North-West and Bombay coasts is the Arab *sambuk*, a roughly built two-masted decked coaster, with low poop and plain stem-head. They hail from the Zanzibar and Arabian coasts, and range to 200 tons register ; being seldom built in India they should properly find no place in this list, but as they constitute an essentially Arab type and are numerous in the ports of Western India it is as well to include them, as they grade into the next form :—

The *batel*, a still more primitive coaster of the *baggala* and *sambuk* type, from which it differs in being undocked except at the extreme ends and being without poop. The stern, stem-head, and general appearance are as in the *sambuk*. As a

rule only one mast is carried, but in the larger ones, which run to 100 tons, a small mizzen is stepped at the after-end of the kelson.

An altogether different form of Arab trader is the *boom* or *dhangi*, a cheap and older form of a small-sized baggala, from which it differs chiefly in the form of the stem terminal and in having a sharp, raked stern in place of the counter and highly ornamental broad stern. They are decked and with a poop, and are generally smartly painted along the topsides in broad fore and aft bands.

The stem-piece is plain and short, bounded by two converging horn-like bars of wood continued forwards from the gunwale.

Dhangis run to 200 tons, are rigged similarly to two-masted buggalas and are said to be exceptionally fast sailers. They are generally owned by Arabs, but are built chiefly on the Indian coast between Karachi and Calicut.

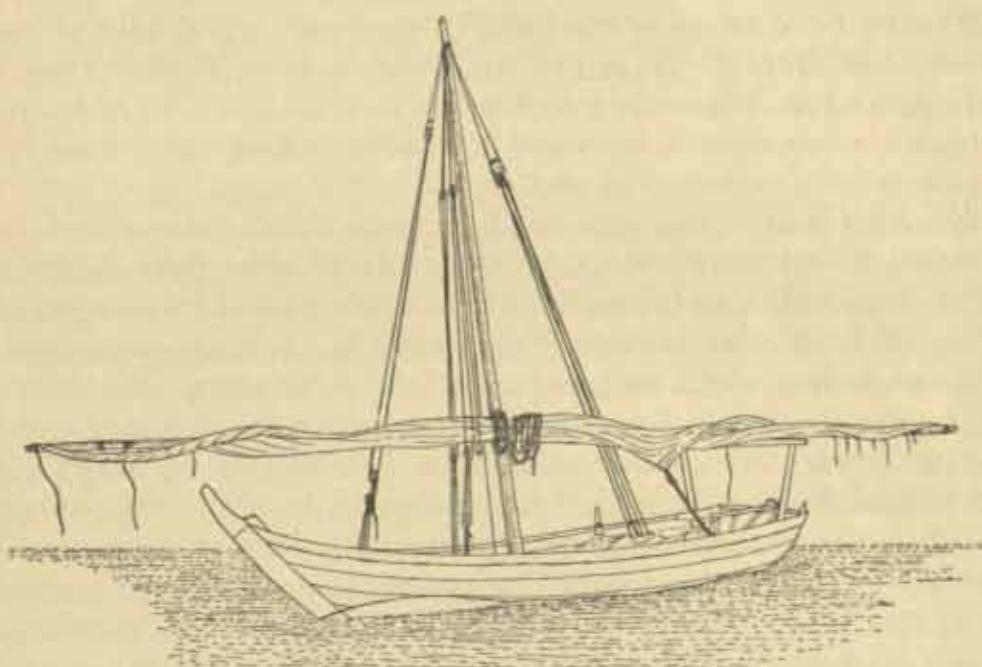


FIG. 1.—Fishing machwa, Karachi.

The *nauri* is very much like the *dhangi* in essential details but has a characteristic "Parrot's head" stem ornament, bespeaking Hindu influence in place of Arab. Beak and eye are distinctly recognisable with a carved crest addition at top, from which the simplified form seen in the *gunjo* must have been derived. They run to about 80 tons register and trade between India, the Persian Gulf and Zanzibar. They are generally built on the Kathiawar coast.

The *boom* or *dhangi* and the *nauri* are the least changed of the Arab type of trading vessel, bespoken by their plain double-ended form. The others, *baggalas*, *gunjos*, and *sambuks* as well as *kotias* and *batels*, respectively Arab and Indian, show distinct Portuguese influence, for their high poops and squared sterns derive these characteristic features directly from the early caravels. The richly carved stern and quarters of

the great baggalas and kotias are almost identical with those of 16th century European vessels of the same size.

The *machwas* used for fishing and minor coast traffic are of two varieties, one having the typical transom stern (fig. 1), the other lean in the quarters and terminating sharply in a greatly raked stern post. The latter type is by far the more common and is the fishing boat design *par excellence* on this coast and indeed as far south as Bombay. It has but a single mast, usually made to unship, and the stern is low and mean in marked contrast with the towering poop of the deep-sea type. The bow is slightly higher and more prominent than the stern, ending sharply and without ornament. Right aft is a "crutch" formed of two uprights set one on each quarter, and connected above by a cross bar on which the long yard and even the mast itself rest when the boat is lying to her nets. Still smaller is the harbour jolly boat, built on the same lines and also used largely for inshore fishing.

In the innumerable creeks of the delta of the Indus the primitive dug-out is greatly in evidence. It is of the usual type and only very rarely have I seen it fitted with an outrigger; I have however seen it as far west as the mouth of the Hab river in Baluchistan.

THE BOMBAY COAST.

Here within the comparatively short range of 650 miles from the head of the Gulf of Cambay to Bhatkal at the southern limit of North Kanara, we get considerable diversity of coast with corresponding variety in the coast craft, which show essential differences from the Arab types of the North-West coast. The races furnishing the fisher and sailor classes are equally varied, both in origin, language, and religion.

In the northernmost or Cambay section for 150 miles we get shoal water and sandy bottom extending far to sea, and not a single harbour that can afford shelter to fishing craft. The estuaries along this coast are also rapidly silting up and hence it is that the boat people of these parts have to combine coast trade with fishing; to do so necessitates the use of large boats and hence we have the apparent anomaly of a poor fishery coast sending to sea the largest fishing boats to be found anywhere in India. The type used is a large *machwa* of handsome and careful construction. Of these there are about 270 in all, ranging from 10 to 20 tons burden manned by a crew of eight men. The supply of fish in their home waters being limited, the great majority of these boats resort to the south Kathiawar coast for three months in the fair weather season, taking to the carrying trade when the fishing becomes unprofitable. The cost of these boats runs to Rs. 2,500 in the case of the largest. They are undecked save for a short length at the stern. The stem is sharp and raked strongly, the stern truncate with but slight rake. The hull is nearly black in colour from frequent applications of oil and sometimes of thin tar. According to the duty required the details of rig and equipment vary. As cargo boats they carry two masts, both with the Arab lateen, and heighten their freeboard by means of temporary mat and bamboo weather-boards. When on this duty they display the characteristic Hindu "Parrot's head" stem ornament, exactly as in the big kotias of Kathiawar.

When employed as fishing boats the mizzen is not stepped ; the figure-head also is taken down and left ashore to permit of the use of a sheave fitted in a slot in the stem-head when riding to the nets. The temporary weather-boards are also removed and the boats are stripped to the gunwale in order to have the advantage of the lowest free-board possible when hauling their great nets. As typical Indian craft, the Gujarat machwas built at Bulsar, Billimora and adjacent ports, as opposed to the smaller ones of Arab design such as sambuks and Karachi machwas and jolly-boats, show an essential difference in the way the hull is constructed. In all Arab style boats the planking is laid edge to edge, thereafter rendered watertight by caulking ; in the Indian design, the edges of the planks are grooved or rabbetted to fit one another closely and in the grooves are laid strands of cotton and a layer of putty. (The latter is made by boiling together a mixture of resin and oil which is subsequently hammered into a paste-like mass). The planks are then drawn together by lashings passed through holes bored in adjoining strakes tautened by means of wedges driven in between the lashing and the planks. When drawn sufficiently tight, long iron nails are driven through the planks and the ribs, the projecting inner ends being beaten down to serve as clamps. This method of construction renders the repair of damaged planks a matter of difficulty but these men look down in contempt at what they consider the crudeness of the caulked planking of Arab-style vessels. Battelas are of the same design but larger and used only for cargo.

Where the fisher crews are Hindus (some are Roman Catholic Christians), old-time propitiatory ceremonies are carried out upon appropriate occasions, which are useful for comparison with those used elsewhere. The simplest of these is performed each time the boat leaves shore ; when the nets have all been taken aboard and the boat is moving off from the landing place, one of the crew empties a chatty of water over the prow.¹ Far more elaborate are the special rites performed usually once a season to the local deity of the locality where the fishing operations are carried on. Usually this is one of the aboriginal village deities—a goddess almost invariably. At Velan in South Kathiawar, the goddess of the harbour promontory is invoked with cries of "Mata! Mata!" as a goat is killed and coconuts are broken at the prow. The men say they know no proper prayers, so merely invoke the deity by name. Usually several boats share the cost of the offerings, which are made on a date convenient to the men. Occasionally if one boat experiences bad luck while others are making good catches, the unlucky crew will make a special offering at their own cost to ensure better fortune. A crude vermilion figure of Ganapathi, 4 or 5 inches high, is often painted near the mast or at the stern as a further bid for the favour of the gods.

For inshore fishing, small open boats, of the same general design, of 3 to 10 tons' burden, are employed, manned by three or four of a crew.

The larger craft used solely for cargo purposes in this region—Cambay to Bombay—consist of the *battela* and the *padao*. Both may be described shortly as large editions of the Bulsar fishing machwa, battelas running from 40 to 100 tons' register.

¹ At Tuticorin the Roman Catholic fishermen similarly splash water on the bow as the boat leaves the beach ; our own custom of breaking a bottle of wine over the bows of a ship when being launched probably has a common origin.

while padaos range from 30 to 60 tons. Both are ordinarily two-masted, but occasionally a very large battela carries a third mast right aft. Both carry a long jibboom inclined sharply upwards. High-peaked rather baggy lateen sails are favoured.

Battela and padao are alike square in the stern, which is little raked; the larger battelas have a counter sometimes elaborately carved and painted, together with a rudder trunk. All have means for erecting temporary weather-boarding in the waist—a feature characteristic of all Gujarat boats, whether they be battelas, padaos or fishing machwas. As might be inferred from the geographical range, the battela forms a link between the baggala and kotia on the one hand and the more southern pattamar on the other, the stern part of the hull being closely related to the former, whereas the rig, particularly in the greater rake of the masts, the cut of the sails, and the presence of a jibboom, approximates to that of the pattamar.

KONKAN COASTERS.

From Bombay to North Canara and indeed as far as Mangalore, an entirely different type of coaster is seen, the pattamar. Here we get at last a design which is certainly indigenous and influenced slightly or not at all by European and Arab example.

Pattamars are readily distinguished by their great sheer fore and aft, the long curved overhang of the bow, their great beam in the quarters, particularly when, as in the true type, the stern is rounded, and more than all by the great rake of the two masts, whereof the main is often nearly as long as the foremast.

They carry a long slender jibboom rigged in or out as required and in the largest size a third short mast right aft.

The great relative length of the aftermast is noteworthy; its sail is larger than in the Arab type of boat, and instead of being seldom set when off the wind—the Arab habit—it is in general and constant use and figures as a principal and not an accessory sail.

These boats, unlike kotias and baggalas, are essentially coasters and fair-weather craft. Hence we find neither permanent bulwarks nor properly laid deck. When required a temporary bulwark of matting and bamboos is employed, further protection for the cargo and crew being provided by a pent-house structure thatched with coconut leaves, between the masts. Fore and aft there is a short length roughly planked over, the remainder being lightly covered with split bamboos laced together and laid on the athwartship beams; it is just strong enough to support a man's weight. The true type is best among the smaller sizes; these hail chiefly from Ratnagiri and Rajpur. In the larger sizes foreign influence is apparent in the transom form of the stern and in the short raised poop, very commonly seen, and the plain oiled treatment of the hull.

Pattamars have none of the fine finish loved of the Arab. No carving adorns the poop when present, neither is the hull brightly banded with gaudy colours and only some of the largest are left handsome in well-oiled mudity. Usually a coating of dull earthy paint, dark red by preference, is applied above the waterline with a black

gunwale and sometimes a white ribbon fore and aft. In those with poops and transom sterns some crude ornamental painting is attempted—stars and imitation ports the favourite. Pattamars are built chiefly at Konkan and Kanarese ports. They range up to 180 tons' register, but the majority are less than half this size.

This type has undoubtedly developed from that of the large fishing boat still used at Ratnagiri and Rajpur, which in turn, as we shall see, is evolved from a spread and built-up dug-out. The pattamar has also many points of family resemblance to the old style coasting craft of Ceylon, as typified in the *Vātra-dhoni*—especially in the character of the bamboo-decking, presence of a jibboom, and in evolution from an outrigger fishing boat. Comparison enables us to see how far the pattamar has travelled—the original square sails became a square-headed lug and then by reduction of the luff, the Arab lateen of the present day. Similarly the jibboom increased in size and importance, and from the sewn planking we have progressed to a bolt-secured hull. In steering, the original primitive form of rudder, completely exposed outside the stern of the vessel with tiller fitting over the rudder-head, has been retained. The palm-thatched pent-house cabin is another well-marked primitive feature.

KONKAN FISHING BOATS.

The section of the coast from a little north of Bombay and on as far south as Jaigarh or Jaigad, a few miles north of Ratnagiri, is generally rocky, well provided except in the north with numerous good harbours, bays, and creeks to shelter the mosquito fleet of fishing boats that crowd this coast. The fishermen are almost exclusively Hindus. The machwas in this section are large for the same reason as those of the Gulf of Cambay—their need to go far to reach the fishing grounds. A fine sea-boat is a necessity and in the larger boats hailing from the ports in the vicinity of Bombay, the fishermen have adopted a modification of the pattamar type of coaster for those which operate in offshore waters. A typical 7-ton Bombay fishing machwa measures 47 feet in length over all, with a beam of 11 feet and depth of 3 feet. The bow is long and raking with great overhang and considerable sheer, so that the actual keel length is short relatively to the beam. Hence these dimensions give a shallow beamy craft with great buoyancy both forward and aft—well adapted to the local conditions of the coast.

The rig consists of a large mainmast and small mizzen, both with considerable rake forwards; the sails are the usual pattamar lateens.

Like its large brother it possesses no permanent deck, but a temporary one is laid when necessary. These boats run the Cambay boats close in the matter of size, the larger ranging from 10 to 15 tons' burden with crews of from 10 to 12 men, the smaller from 5 to 10 tons with proportionately fewer hands aboard. Bombay harbour shelters a host of smaller single-masted machwas otherwise of similar build, together with still greater numbers of small double-ended canoe-shaped fishing boats carrying a single mast and lateen sail. All these small craft come under the generic name of *hody* but the men themselves have several distinct terms to distinguish

varieties possessing some special detail or more frequently applied according to the work they are engaged upon. In size a typical hody may be anything from 22 to 40 feet in length by $2\frac{1}{2}$ to 8 ft. beam, with a register tonnage of from $\frac{1}{2}$ to 6 tons. They represent a widened copy of the ordinary West Coast dug-out, called *toni* in Bombay, built up of planks; indeed in the case of the very small ones, the boat is actually a dug-out. An ordinary rudder is fitted to the stern post by lashings or by iron gudgeons and pintles in some boats. Stem and stern are curved at about the usual angle adopted in dug-outs. These boats are quite open and unlined, but from the stem-head to a point just abaft the mast a weatherboard about one foot wide is fitted along the gunwale to keep out the seas and spray. At times they employ an outrigger of the same form as we shall see is employed by the smaller Ratnagiri boats, to increase stability; *this locality (Bombay) marks the northward limit of the habitual use of this device on the west coast of India.*

From Bombay to Jaigarh some 100 miles south, machwas and hodys of the Bombay pattern, manned almost entirely by Hindu fishermen, continue the characteristic fishing craft in common use. From this point (Jaigarh) southwards to the Kanarese border, Muhammadan influence prevails except in Portuguese territory, where the fishermen are mostly Christian. The coast along the whole of this stretch is particularly well-adapted for fishing, the shore line indented with creeks and sheltered coves, and with numerous harbours and estuaries which provide shelter for fishing craft and coasters of every size and of varied description. The bottom right to the shore is usually sandy and hence inshore net fishing is practised to a far greater extent than to the northward of Jaigarh.

Ratnagiri and Rajpur are the two great fishing centres on this part of the coast north of Goa; the Muhammadan fishermen (Daldis) of these ports have made the name of Ratnagiri famous along the whole west coast by reason of their intrepidity and skill, in which qualities they far exceed the fishermen of Kanara and Malabar. For deep-sea work they employ a beamy single-masted lateen-rigged machwa of low freeboard, while for inshore fishing they are fond of outrigger canoes of varied form and size.

The deep-sea Ratnagiri and Rajpur boats are of three sizes, and many of them fish for part of the year, usually on contract, on the Kanarese and North Malabar coasts, regularly coming as far south as Mount Deli and occasionally to Cannanore.

These boats are employed almost exclusively in drift-netting; the two larger sizes are single-masted lateen-rigged open boats, very broad in the beam, handsome in their lines, with long overhanging bow, round stern and raked stern post. Like Danish and Nordland open fishing boats they are low in the waist—to facilitate handling of the nets—and have therefore comparatively low freeboard; both alike fit a weatherboard when heavily laden and both depend on a single mast and single sail. The smaller of the two large Ratnagiri boats returns daily to port, but the larger, which is used in deep-sea shark and ray fishing, frequently keeps the sea for several days.

The smallest type of Ratnagiri deep-sea boats is an extremely interesting develop-

ment of the outrigger canoe. The basis, in common with the better known Ceylon form, is a dug-out canoe, which, having first been softened, has the sides cautiously and slowly spread by means of wedges till they attain a distinct flare. On the flared edges a series of strakes, also flaring outwards, is raised—Malay fashion—till the slab-sided crank dug-out is changed to a beamy and fairly roomy boat capable of carrying quite a heavy load of nets. A single outrigger is boomed out in the usual manner and the boat carries a lateen sail of the same type as her larger sisters.

All these boats carry a very small outrigger canoe as net tender. In this the original dug-out is left unspread, and as the outrigger can readily be dismounted this form has the advantage that it can be easily taken aboard and stowed out of the way.

A hurdle-like mast-crutch similar in form to that described above in the case of Sind fishing boats is fitted aft on Ratnagiri boats of every size. Usually it is neatly ornamented. It seems clear that the larger boats have been modelled upon the built-up canoe form, the outrigger being dispensed with as soon as increasing beam gave sufficient stability without recourse to such an awkward contrivance. To the Ratnagiri coast people seems due the credit for the first advance in boat-building made on the west coast of India; there it is that we have to look for evidence of an outside influence long antedating that of the Arabs and the Portuguese.

The Ratnagiri and Kanarese pattamar coasters are in turn cargo carriers designed on the same general lines. On the Ratnagiri coast, using this term in a wide sense, what may be termed the Ratnagiri type of single-masted fishing machwa and two-masted coasting pattamars exist side by side with outrigger canoes, built-up outrigger boats and ordinary creek dug-outs, but after Malwan, a little to the north of Goa, the Ratnagiri machwa dies out completely, leaving the major part of sea-fishing to be done by outrigger boats and canoes, with operations confined almost entirely to the inshore waters. The largest outrigger boat is one used in seining, the so-called Rampan boat. This is merely a long, deep, widely-spread canoe-shaped boat fitted with an outrigger to give stability. Stem and stern are nearly similar and no mast is carried, the boat being rowed while the net is being shot.

After we pass Goa the number of true dug-outs employed in fishing rapidly increases, and especially at Kumpta, Honavar and Mulki, these *pūngayis* are very numerous. They are the same as the *odam* dug-outs of Malabar. They are of considerable size, from one to 3 tons' burden, and each carries a crew of 8 men normally. In South Kanara these fine canoes are still more in evidence whereas the outrigger boat is seen only in commission in the case of the Rampan boat which, be it noted, is of comparatively recent introduction on this section of the coast, having been introduced from Goa. The Kanarese fishermen and boatmen suffer distinctly from a lack of enterprise and there is little to be learned from a study of their fishing craft. Either they are outrigger boats borrowed from their northern neighbours, or are primitive dug-outs from the south.

Typical of their lack of boat-building skill are the coffin-shaped backwater cargo carriers of Mangalore. Although this is one of the busiest ports on the west coast,

full of finely modelled fishing and coasting craft in the fair weather season, these boats are slab-sided, sharp ended, punt-shaped craft—bad plank-built enlargements of a dug-out canoe; they boast no rudder, have a single mast bearing a square sail as unnautical in shape as an inland tailor would cut and fashion but presumably are cheap to construct and answer their purpose in the calm waters where alone they are used (Pl. v, fig. 4).

MALABAR AND TRAVANCORE.

The dug-out and the pseudo-dug-out—its counterpart in planks—have the field entirely to themselves in this long stretch of coast from Cannanore to Quilon. The former is a beautifully fashioned craft, the latter—like the Mangalore lighter—an ugly travesty. The dug-out is more numerous and while it ranges in size from a tiny one-boy canoe to the big *odam* with its crew of eight, the plank-built canoe is usually of the large size only. It is particularly in evidence at Tanur, where it appears to be in the majority.

There is so little variation in the type that there is almost nothing to say of them. None is provided with a rudder, steering being effected by means of a big paddle on one quarter, used for propulsion as well as control. Few of them use a sail; when they do, it is either a small and ineffective square sail or a spritsail. Beach lighters, the equivalent of the masula boats of the East Coast, are again merely clumsy flat-bottomed enlargements of the plank-built fishing canoe, but the large cargo lighters which have often to carry cargo to steamers in the outer anchorage at Calicut are weatherly craft reproducing in a rough and untidy form the Arab features of grabbow, deep fore-foot, sharp raking stern and large lateen sail. They are undecked, without poop, and are indeed but large editions of the single-masted Bombay machwa. The strength of the Arab strain in their design at Cannanore, Calicut, Beypore and Ponnani is due to the long-established trade connections between these centres and the Arabian coasts, and to the not inconsiderable infusion of Arab blood among the better classes of the local Mappilla population. Particularly close is the Arab connection with Calicut. As soon as the south-west monsoon moderates, Arab buggalas begin to arrive, those from the Persian Gulf with dates, those from Karachi and Bombay with more general cargo. The cargoes having been discharged, those requiring it are hove down on the beach to get advantage of the excellent repair facilities existing here. Then the return cargo of Gulf boats must comprise a big assortment of ship-building materials for the boat-building yards of Bahrein, Koweit, and the Tigris and Euphrates; the *nakhudah* and his men have a busy time for weeks on end, selecting and chaffering over the purchase of timber and coir yarn, blocks and bolts, and all the varied etceteras of ship chandlery. Then the timber must be sawn and the coir yarn twisted into cordage and the huge hawsers these men love, under their immediate supervision.

In South Malabar, in Cochin and in Travancore, where an extensive inland water trade exists by virtue of the great network of backwater channels in the low footland skirting the Ghats, particularly fine dug-outs are employed. Compared with the

coast canoes, they are wider and more roomy ; that they are not used on the coast is due to their great weight which would prevent easy beaching. They are undecked, but cargo and passengers are securely protected against rain by a beautifully constructed arched roofing of cadjans made partly in sliding sections for ease in loading and unloading. Paint is never applied and save in the ornamentation of the prow they are severe in line and wanting in decoration. A rich aroma of ancient and rancid fish oil hangs over all, this being found most effective as a preservative for the wood, to which it imparts a rich brownish-black tint that harmonizes with the heavily shaded banks of these tree-shadowed waterways.

For festive occasions specially long and narrow canoes are brought from their sheds. These are known generally as snake-boats, and while those of Cochin are remarkable only for their length, those of Travancore are unique in design throughout India. Instead of being deep and slab-sided as in the Cochin type, the Travancore snake-boat has had the gunwale so cut down that the transverse section of the boat is a very shallow crescent ; the freeboard in consequence is reduced to a minimum. The stern curves high above the steersman in fashion like that of the Phoenician galleys depicted on Assyrian sculptures. Like the latter also the prow is remarkably low and ram-like, ornamented in the case of the Travancore boat with a large metal boss in the place where the bronze spur occurs in ancient war-galleys. A further point of resemblance is that the oars end in rectangular paddle blades.

Apart from the modern cargo lighters which date back only to the introduction of steamer traffic on this coast, no sea-going vessels have here their home. This is not due to any lack of skill in shipbuilding for the Malabar shipwright class are renowned as among the best of their craft in India, so much so that they are in demand as foremen shipwrights in the building of lighters, schooners and brigs at every shipbuilding centre on the south-east coast from Tuticorin to Negapatam where this industry still flourishes.

The cause is to be sought rather in the lack of maritime enterprise in the coast population. Stranger craft, chiefly from the Bombay coast, have ever been ready to do all the coast-wise traffic, so, to compete therewith has needed greater enterprise than the somewhat lethargic or phlegmatic Malayali can compass. Competition would have indeed to be vigorous to oust the Kutch kotia, the Konkan pattamar and the Tuticorin dhoni, and life is too easy in Malabar to justify such exertion. The damp and enervating climate is a very potent brake upon energy and enterprise on that coast.

Before rounding Cape Comorin and entering on a world where entirely different conditions prevail, we may note :—

- (a) That purely Arab designs prevail along the whole north-west coast.
- (b) That while the Arab types have influence from Cambay to a distance of some 100 miles southwards of Bombay, the purity of design has gone and some notable modifications have been introduced ; chief of these are the increased value given to the mizzen sail and the addition of a small jib.
- (c) That on the Ratnagiri coast the larger boats, both those used in fishing

and coasting, appear to have their hull modelled on a more beamy and shallower type than anything based upon the fundamental Arab design. As the Ratnagiri men employ for their lighter inshore work a much flared dug-out with built-on upper strakes also flared, it is probable that their large boats, beamy and of little depth, have been evolved from the flared dug-out rather than from the deep Arab type.

- (d) Between the Ratnagiri region and that of South Kanara, the outrigger in various forms, but none so highly developed as in the Ratnagiri craft, is dominant and hence suggests long-continued employment, and an ancient foreign connection long antedating the advent of Arab influence.
- (e) Malabar and Travancore furnish uniform and purely indigenous types of canoe as the only craft in local use, with the trivial exception of recently introduced cargo lighters of Arab design and of a curious form of backwater "snake-boat," used for important water festivals in Travancore, which shows a surprising resemblance in important points with the Phoenician type of armed galley; this is probably merely a case of parallelism.

GULF OF MANNAR REGION.

As Cape Comorin is approached going south along the Travancore coast, all the familiar landmarks of the southern section of the west coast begin to change. The Malayali language becomes corrupt with Tamil admixtures, and eventually is lost in an equally uncouth and corrupt Tamil; the habits and customs of the people are also Tamilized, and even more notable is an alteration in the character of the vegetation. The dense humid tropic lowlands where plant life riots in luxuriance and where the coconut dominates all cultivation, gives place to naked sand wastes, the coconut withers away and in its place rises stiff and unbending the formal Palmyra palm and the inhospitable babul. Coincident with these changes, we find the methods of fishing also begin to alter. The crank dug-out canoe to which the Malayali adheres with such touching fidelity, as far north as Quilon finds its supremacy challenged by small catamarans of primitive form, constructed of from 4 to 5 logs tied together raft-fashion. From Quilon southwards both forms of craft exist side by side as far as Colachel where catamarans of improved form—"boat-catamarans"—appear and finally oust both the dug-out and the raft catamaran. Between Colachel and Cape Comorin the coast is particularly exposed and surf-beaten throughout the year and is also bare of any landing place suitable for dug-out canoes. Beyond the Cape the same form of catamaran is numerous for over 100 miles, ending only at Mukkur in the Ramnad district. Throughout the whole of this tract of coast the only important caste of fishermen is that of the Roman Catholic Parawas, whose ancestors for political reasons became converted to Christianity on the coming of the Portuguese. Besides the boat-catamaran these people use largely a second type of craft—the "boat-canoe"—which consists of a Malabar dug-out spread by wedges and heightened by flared wash-strakes of 9 to 10 inches

in width. The two types exist side by side save at a few very exposed centres such as Cape Comorin, and both are worked exclusively by Parawas. Nowhere else in India is either type found, so that this strict limitation, being regional as well as racial, is particularly notable. The boat catamarans vary little in size (fig. 2). They are worked normally in pairs and usually one of the two is slightly longer and wider than the other, the former being 23 feet long by 3 feet wide, the latter 20½ feet by 2½ feet. Of the three logs of which they are made the central one is stouter than the

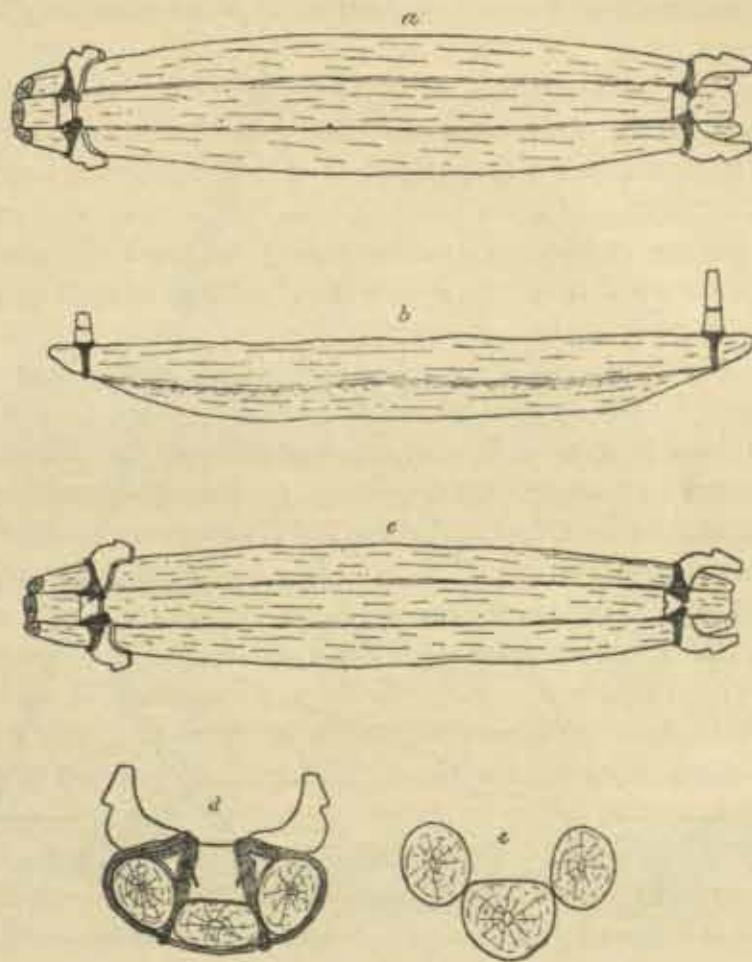


FIG. 2.—Boat catamaran of Cape Comorin and the Tinnevelly coast. *a* and *c*, large and small units of a pair; *b*, side view of *a*; *d*, transverse section near one end; *e*, transverse section at mid-length.

side ones; the whole three are shaped and fitted together in such a way that the central one fits keel-wise at a lower level than the other two which rise sufficiently high to form a trough-shaped hollow above. At each end the logs are planed flush on the under surface to give an easy entrance. The three are held in position by a transverse two-horned block of wood at either end, whereto the logs are lashed securely by coir ropes passed through grooves cut in the sides of the logs. Usually two men form the crew, using, instead of wooden paddles, short lengths of split bamboos wherein they differ from the Coromandel catamaran men who use broad-

bladed paddles of two designs. When paddling, which they do as seldom as possible, they frequently stand up spooning the water rather than rowing or paddling. That early English mariner who saw them miles out from the coast and probably was the first Englishman to make reference to them, may well be excused for recording his surprise at seeing "distinctly two black devils playing at single stick. We watched these infernal imps about an hour, when they were lost in the distance. Surely this doth portend some great tempest."¹ The description exactly pictures the scene if one be far enough away to overlook the catamaran which floats almost level with the water.

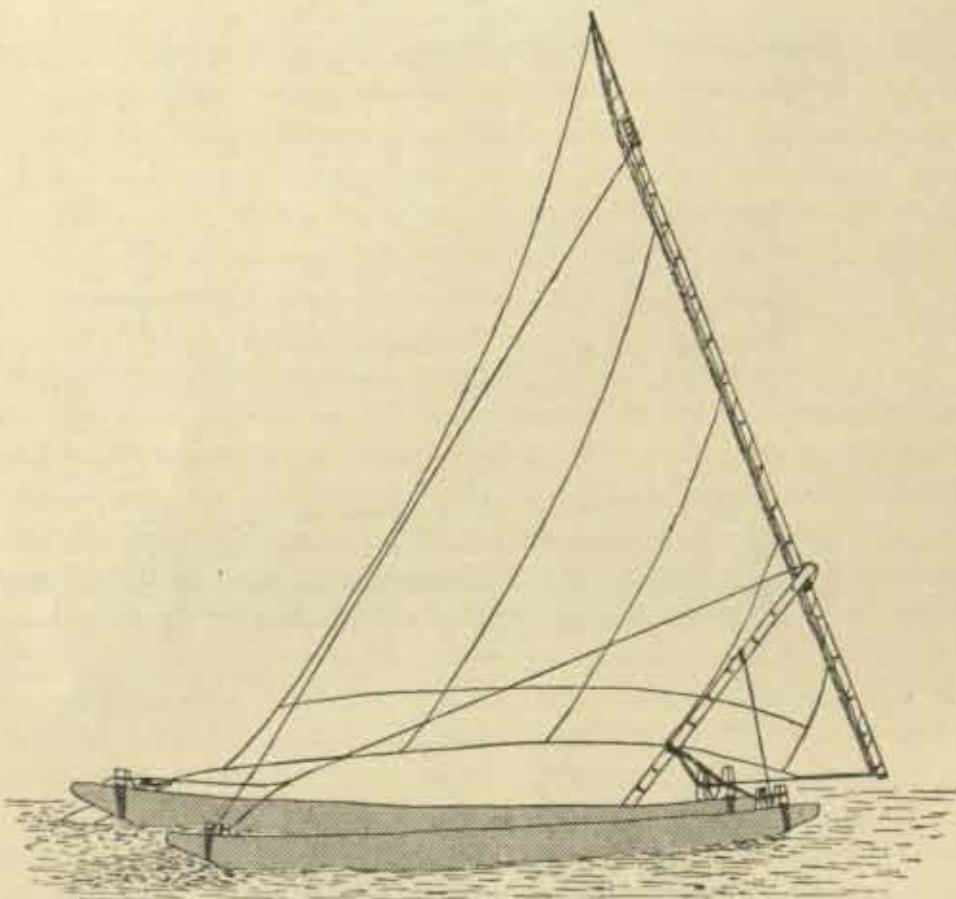


FIG. 3.—A pair of boat-catamarans under sail. Tuticorin.

Unlike Coromandel catamarans, the logs are kept permanently tied together; they are neither painted nor oiled, neither is any ornamental carving employed.

To go to and from the fishing grounds a small triangular and nearly equilateral sail is used, fitted to the head of a diminutive spar 10 feet in length, set up with a strong rake forward right in the bows, *i.e.* at the end which functions as such—both ends are almost alike in structure. A light bamboo yard of considerable length (34 feet) carries the brown tanned cotton sail (fig. 3). Mast and sail are common to each pair of catamarans, the mast being stepped in the larger while the sheet is led to the

¹ Quoted by Thurston, E., *Castes and Tribes of S. India*, VI, 179.

stern of the smaller, of which the fore end is lashed to the other. The two craft do not lie quite parallel to one another when sailing but diverge slightly aft. This particular form of catamaran appears to be favoured on this coast rather than the wider one seen further north, as affording greater stability in the wicked short cross seas that so much prevail in this region. On the other hand the great surf rollers that career shorewards over long stretches of shoals on the Coromandel coast can be ridden over much more safely by a broad-built raft than by a heavy, deeply keeled craft. The Comorin and Tinnevelly coast is also fairly well served by little coves and bays, which give just enough security even in bad weather for the safe beaching of these catamarans.

Catamarans are used almost exclusively in that particular form of fishing where the madi valai is employed. This net is a deep-water or boat seine shot from two partner catamarans across the path of shoaling fish. The almost total absence of freeboard in the catamarans enables this net to be hauled with ease, not possible in the high freeboard boats next to be described—a quality that goes far to ensure the survival of this apparently antiquated type.

For other forms of fishing on the Tinnevelly coast, the boat-canoe already alluded to is exclusively used. For the principal methods different sizes are employed. All are termed *ballams* or *vallams*, almost the same term as is used by Mesopotamian Arabs for all dug-out canoes and for all boats of canoe form—long, narrow and keelless.

The essential differences between these canoe-boats and the ordinary Malabar dug-out, is that the original dug-out has been spread and its sides raised so that considerable stability is acquired. Instead of depending on paddles for propulsion these boats are designed primarily for sailing and on a fair wind they have a fine turn of speed. Close hauled they perform badly as they are wholly without keel, having retained the original rounded bottom of the dug-out.

The mast is of medium height and is fitted nearly amidships. The rig is a single short and wide lug, not very far removed from the square sail from which it is clearly derived (fig. 2, pl. v). Except in enlarged models built wholly of planks upon the same lines for coral-stone work, no mizzen is carried. A peculiarity of these canoe-boats is a double pulley fitted in a square truck upon the extremity of the mast to which point the yard is hoisted. Owing to the high freeboard and the lowness of the thwarts, so placed to secure good stability, rowing is difficult and wearisome to those not accustomed to these boats. In one case in which we lent one to some Kilakarai divers they complained so bitterly of this, that fresh thwarts had to be fitted six inches higher than the original ones.

A powerful rudder of elegant shape is employed, fixed with the usual gudgeon and pintle; it descends considerably below the rounded bottom and thus contributes slightly to reduce the disability of want of keel. It is strange that the use of a leeboard is unknown or unpractised seeing that this is employed regularly by the outrigger boats of Ceylon, Kilakarai and Palk Bay. The introduction of this useful accessory is therefore one of the minor improvements now being brought in by the Madras Fisheries Department.

Various sizes of these vallams are used according to the nature of the fishing. The largest, having crews of 7 or 8 men each, are used in line fishing, 7 to 10 miles off shore; a slightly smaller size, about 27 ft. long, is used in off-shore drift netting and by divers engaged in the chank fishery, while still smaller ones are used for inshore lining and netting.

At Tuticorin a few of the largest size are employed also by coral-reef quarriers to supply stone to the local building trade and sea-worn madrepore branches (*chulli*) to lime-burners. The bulk of this coral-stone work is however carried on by large

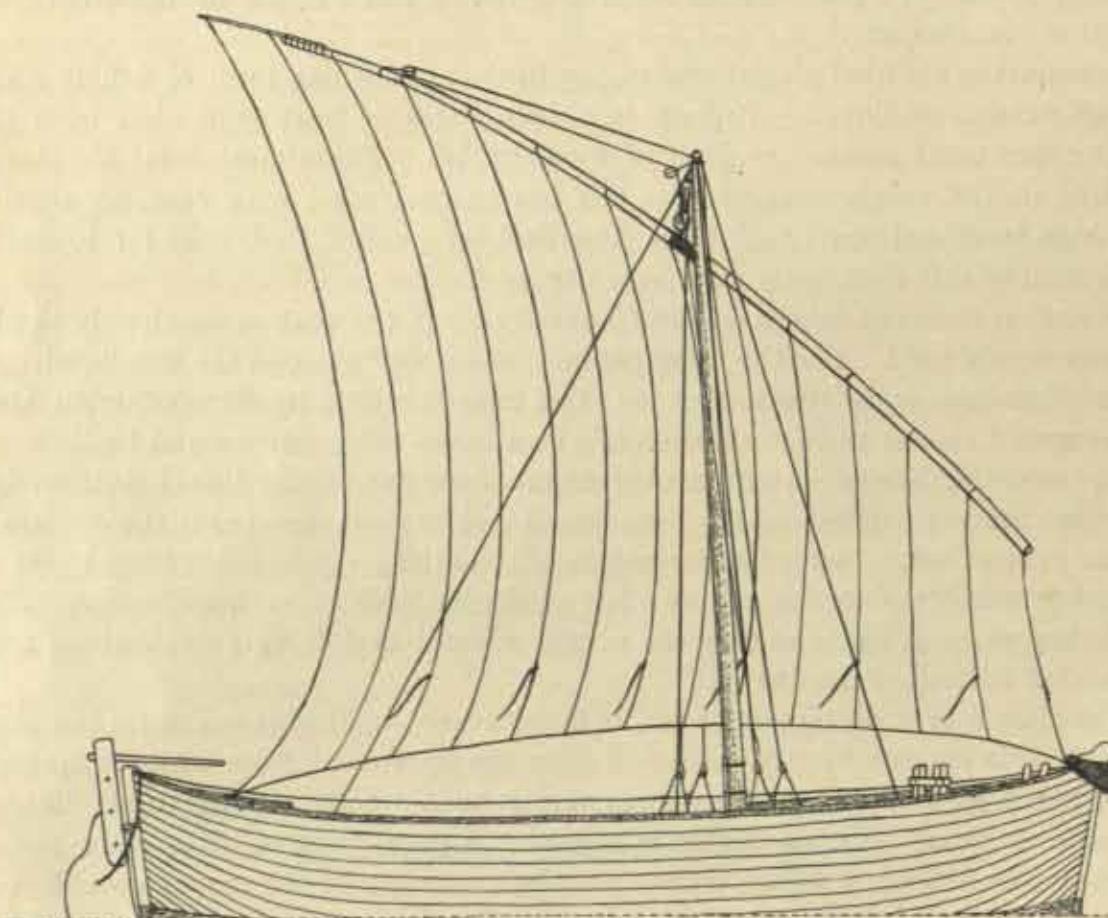


FIG. 4.—A Tuticorin cargo lighter.

plank built boats constructed as already mentioned on similar lines. The average dimensions of these are:—length 34 feet, beam 6½ feet, depth 2½ feet, with a load capacity of about two tons. Usually they have the same rig as the dug-out type, but when on a coasting voyage they generally fit a short mizzen carrying a small lug. At the same port (Tuticorin) a fine fleet of sailing lighters and coasters has been created since steamer traffic was introduced, and nowhere can the successive steps in the evolution of a new and dominant type be better studied than here. When coastal steam traffic developed on the Indian coast about the middle of last century the cotton pressers of Tuticorin built or brought to the port several square-sterned sailing lighters on Eng-

lish lines, rigged as small schooners with fore and aft sails and jibboom. The trade appearing likely to prove lucrative, some of the local Parawa boat-owners began to build other lighters. They rejected the English model as this had been found unhandy in going alongside steamers; instead of that they followed in simplified fashion the lines and rig of the Arab buggalas which at that date regularly traded between Busra, Bombay and Tuticorin. The boat-builders while adopting the raked stem and stern and lateen rig, made both stem and stern sharp as in present-day Calicut lighters. The model did not serve over-well and gradually the rake of stem and stern was reduced till to-day both are almost vertical and the mast instead of being raked forward is now raked very slightly aft and is fixed at about one-third the boat's length from the bows (fig. 4). The present-day lighter appears as though it had evolved directly from the plank-built canoe used in the coral-stone trade, a course which it has not followed as shown above. Originally Tuticorin lighters, having been introduced by English firms, were known locally as "boats" (*boatu*), but now this has given way to the vernacular term of *dhoni*.

It is interesting to know that the first built native lighters had their bottom coated with white chunam pitch in the Arab style. Later some owners employed tin sheets as a protection, and then with greater prosperity the further step was taken of sheathing in copper. A few have tried Muntz metal sheets, but the general opinion is that copper is the only reliable metal to use. In this I concur, experience of the yellow metal which sheaths the bottom of our Inspection schooner showing it is no protection whatever against the settlement of oysters and other growths, whereas lighters sheathed with copper keep clean and unfouled. No further sail than a single big lateen is used when engaged in lighterage to and from steamers lying in the roads (fig. 1, pl. v), but when coasting between ports—they now go as far up the East Coast as Bombay—they add a jib and small lateen mizzen.

Quite recently a further evolution has been made, an enterprising boat-owner having built several larger vessels (*padagu*) solely for coasting trade. They are two-masted and fully-decked, but retain the straight stern of the lighter design. As regards rig, they are fitted with jibs but whereas the first one built had a great lateen on the main mast and a fore and aft sail on a big mizzen, the later ones exchanged the clumsy lateen for another fore and aft sail, so that now the final form evolved is a fore and aft schooner rig such as one may see anywhere in British seas among small coasting craft in out-of-the-way places.

CEYLON.

No greater contrast can be found in boat designing than that between the types used on the opposite sides of the Gulf of Mannar south of latitude 9° N. On the Tamil or Indian side the catamaran and boat canoe alone are used; on the Sinhalese side, the outrigger canoe is the national and dominant design, the catamaran being used only in the northern or non-Sinhalese part of the island, and by immigrant Tamil fishermen at Colombo, while the dug-out is restricted to its proper sphere on rivers and other inland waters.

The outrigger canoe, called *oruwa* in Sinhalese and *kūlla* in Tamil, as used in Ceylon is one of the most distinctive craft in the world; moreover its form has become strictly stereotyped, bespeaking very long lineage and an end to the experimental stage. As we see it thus fixed in design, the hull consists primarily of a long dug-out with tumble-home curve along the upper side. Upon the original gunwale is sewn with coir yarn a wide vertical wash-strake on either side, leaving a well-shaped opening running the length of the boat, so narrow that sitting on a boom where it crosses the hull—there are no thwarts—a passenger can usually accommodate only one leg inside!

The rig is a high and somewhat narrow double spritsail of large area. The mast sprit is a stout, carefully chosen bamboo stepped exactly amidships. The other sprit is fully as long and only a little less strong than the mast. The sail is cotton, usually tanned brown. The outrigger float is a carefully-shaped well-smoothed log of light wood, boomed out permanently by two cross pieces made up, not of a single pole as in the Kilakarai outrigger boats shortly to be described, but of a number of thin flexible pieces bound tightly together fascinewise.

In outrigger canoes used for sailing, the outrigger must necessarily be on the weather side in order to give the necessary counterpoise. Now the Ceylon type having a permanently fixed outrigger, cannot have any definite stern or fixed rudder. Accordingly we find the two ends are similar, so that either may function as bow as required. In place of a rudder a long-bladed wide paddle is used on what should answer to the quarter, being supported in a coir grommet passed through a hole in the gunwale. On returning from sea with the wind in the same quarter, the sail has to be reset on the other side of the mast and the quarter paddle shifted to the other end of the boat which now becomes transformed from bow to stern. To compensate for lack of keel, a powerful leeboard is carried at each end, to be used according to which end of the boat is acting as stern. No other boats except these Ceylon outriggers and those used in Palk Bay and Strait and around Kilakarai appear to use this most useful contrivance. It is never used for example in the boat-canoes of the opposite Indian coast, whose most notable weakness is inability to sail close hauled and which make a terrible amount of leeway in such circumstances.

The Sinhalese are so wedded to the outrigger that they also apply this device in the design of their small coasters. These were at one time very numerous in the carrying trade between the island ports, giving such an old-world touch as we seldom see in these prosaic days of fussy steam coasters. These Yathra *oruwas* as they are termed, run to 50 tons' burden. They are usually fitted with two-pole masts and a short bowsprit and are provided with a boomed-out outrigger of massive size, similar in general structure to those of the fishing boats. No iron is used in putting the hull together; the planks are sewn together with coir yarn in the same manner as is employed in building the masula boats of the Madras Coast, the work being rendered watertight by laying over the joints long strips torn from the leaf stalk of palm leaves, with dried plantain leaf stalks put between the plank edges as caulking. To sew the planks together a row of closely set holes is bored along the edges of adjoining planks and

through these holes coir yarn is passed and tightened over the caulking strips which are placed both inside and outside the seams in the hull.

No deck is provided, the cargo when loaded being protected by a penthouse covering, thatched with cadjans, a method adding to the archaic appearance of these old-world craft. They hail almost entirely from the coast villages lying between Colombo and Galle—the south-west coast—a purely Sinhalese region save for some settlements of so-called "Moormen"—the descendants of Indian Muhammadans from the opposite side of the Gulf. Few of these outrigger dhonis are now in existence and soon they will disappear entirely. Their survival or rather their presence on the Ceylon Coast is of much interest ethnologically in view of the representation of ships of the same general type among the sculptures on the great Buddhist shrine at Boro Budur in Java, dating back to between 750 and 900 A.D.

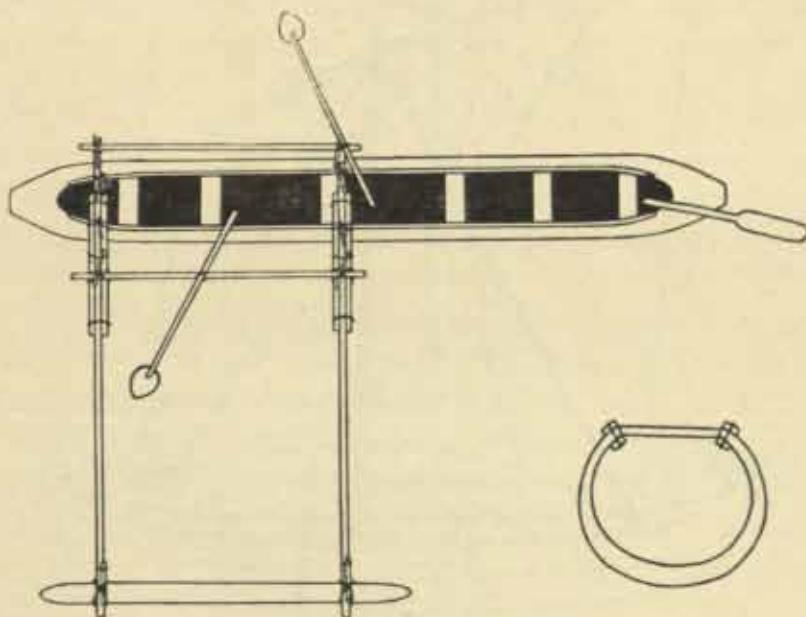


FIG. 5.—Outrigger canoe used by Jaffna schooners and dhonis as ship's dinghy.

The Tamils of the north of Ceylon and the Jaffna Islands do not employ outrigger canoes except small ones carried by coasters for communication with the shore (fig. 5), using instead, according to the character of the coast, either catamarans or dug-out canoes for ordinary fishing, and undecked plank-built boats for pearl and chank fishing and light cargo work. These last-named are of no special interest, being merely large boats built on the lines of a broad canoe. They have a single mast stepped a little forward of amidships; the rig is a square lug little removed from a square sail. The yard is hauled to the mast-head through a square two-way pulley fitted permanently to the top of the mast, in the same fashion as that followed by the smaller Tuticorin fishing canoes. This square pulley truck is characteristic of the Jaffna rig, as is the love of their owners for a bright green or blue coat of paint over the whole hull, in this differing alike from the Kilakarai habit of leaving the planks bare and from the sombre Tuticorin preference for a coat of tar.

KILAKARAI.

The Muhammadan fishermen of Kilakarai and the neighbouring villages on the south coast of Ramnad district, at the north-west corner of the Gulf of Mannar, constitute the main diving force whenever a pearl fishery is held in Ceylon waters; yearly they spend some six months in north Ceylon waters fishing chank shells. Hence their relations are most intimate with Ceylon and this may have determined the outrigger canoe as the type of boat adopted here for general fishing purposes. But while the true Ceylon outrigger in its typical form is largely used for trolling by these men, the boats being imported ready for work from Ceylon, those engaged in other methods of sea-fishing, except for pearl oysters, while agreeing in the

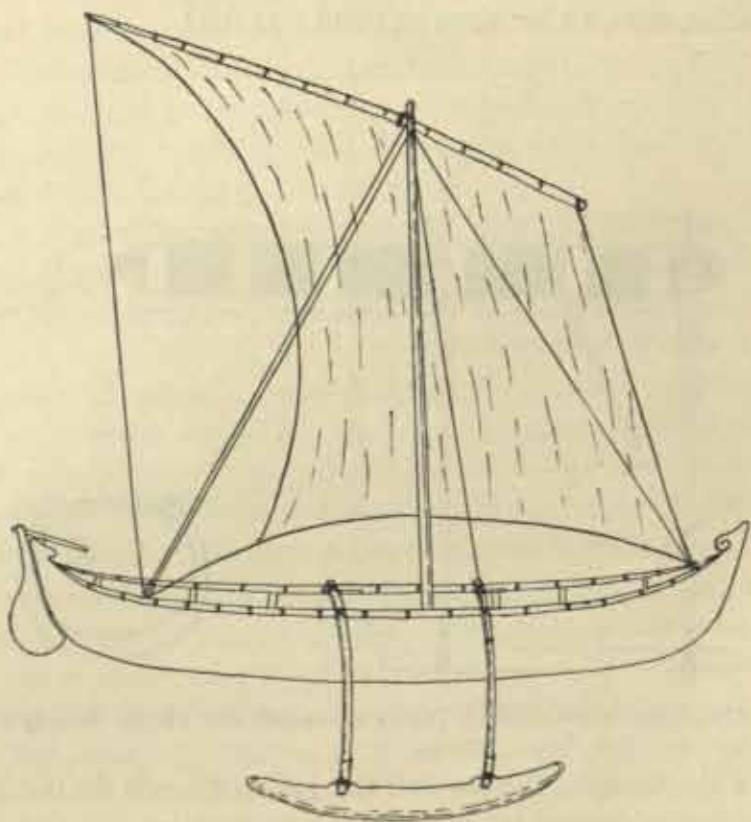


FIG. 6.—A Kilakarai outrigger fishing-boat, with two booms.

adoption of the outrigger principle, have shown marked ingenuity in modifying it in several notable details, whereby it has become much more useful for general purposes in contradistinction to the specialization adapted in Ceylon to one limited and specific aim—that of trolling for large fish of the mackerel family.

Two varieties of these modified outriggers exist, the one using a single pole to boom out the outrigger, the other employing the normal two (figs. 6 and 7). The hull is a simple Malabar dug-out canoe, with usually a *narrow* wash strake added vertically—not flared. The rig is a simple squat lugsail of the same form as is employed in the Tuticorin fishing canoes. No attempt is made to spread the canoe, so without

an outrigger it can be used only in calm weather. It is so used occasionally but normally the outrigger is fitted. The latter is smaller than the Ceylon type and boom pole or poles are weaker and each consists always of a single pole without fascine strengthening. But the most remarkable divergence is that these outriggers are made to unship instantly by a very simple device and can be rigged out on the other side of the boat, thus avoiding the unseamanly custom of the Sinhalese who can never say which end of canoe is the head without looking at the direction they may happen to be sailing! The Kilakarai boats can therefore employ a rudder fixed at the sharp curved stern by the orthodox pintles and gudgeons. The details of

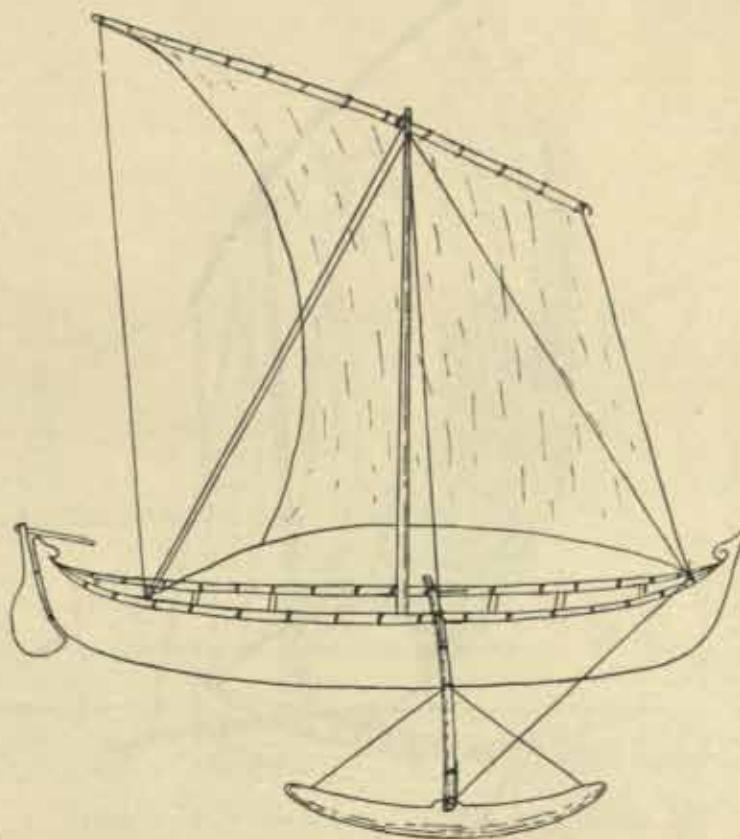


FIG. 7.—A Kilakarai outrigger fishing-boat furnished with one boom only.

the stays led to the outrigger are readily seen in the sketches given. The device for attaching the booms inboard on the one side and to the outrigger on the other is a form of the Spanish windlass, well known to sailors and shipwrights for exercising force in bending a plank into position and holding it there till secured; the principle is that of the surgeon's tourniquet. In the present instance the loop end of a ring of rope or grommet is passed through a hole either in the gunwale or in the outrigger float, the boom pole is laid over this and the looped ends of the grommet are brought up at each side and over the pole; the end of a short rod or stake is passed through the two loops and then by the simple device of twisting the two loops round one another by means of the rod, the two main parts are bound together with

the greatest possible tightness. The free end of the tourniquet rod is then seized to the gunwale or the boom as the case may be, and if the various parts be sound, this lashing will maintain attachment under any ordinary violence. Its chief advantage lies in the rapidity with which it can be operated. A couple of seconds suffice to release the boom and scarcely more are required to reship it.

For pearl-fishing work large carvel-built boats, long and narrow, are used, designed on the lines of a dug-out canoe; they accommodate a large number of divers, and by their length and narrowness are capable of being towed with the

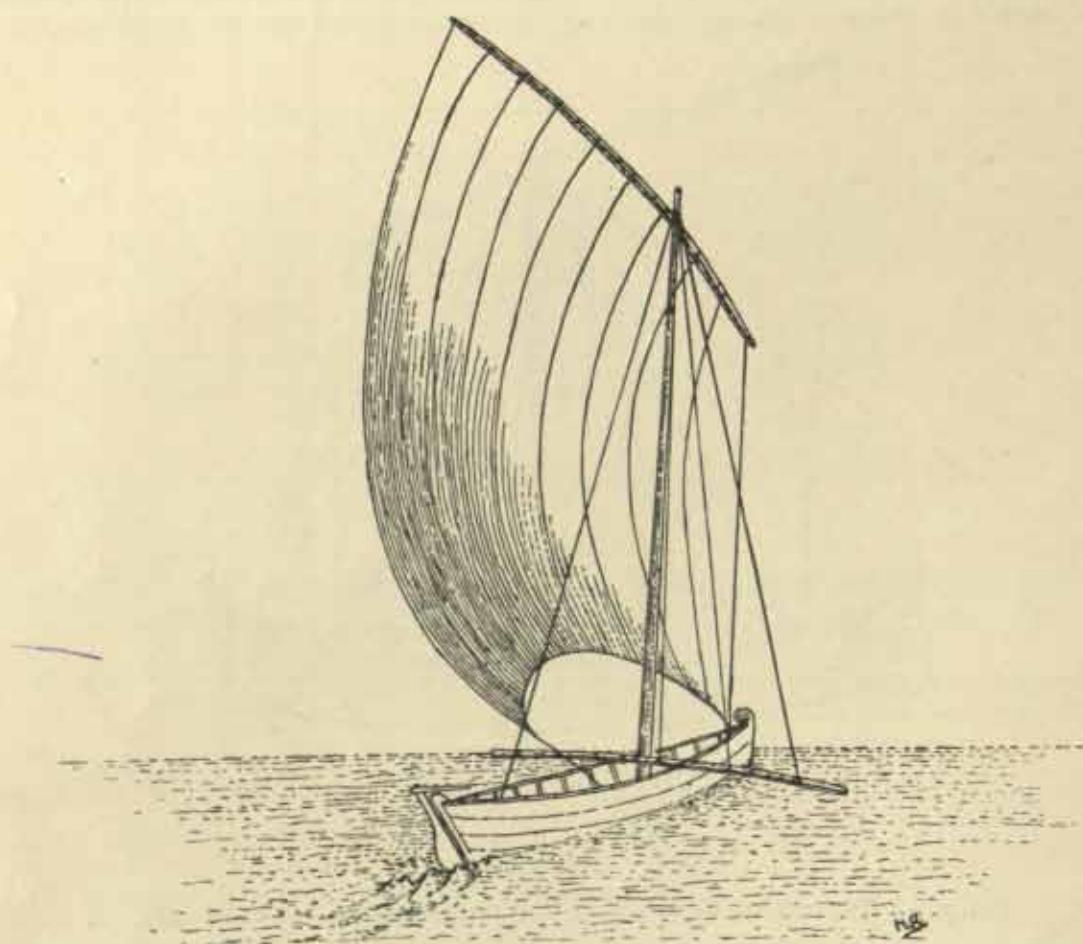


FIG. 8.—A balance-board fishing canoe of Tirupalakudi, Palk Bay.

minimum of exertion from place to place in search of a good pitch. Both ends are sharp, the point of the prow being wrought into the usual coiled ornament.

PALK BAY AND STRAIT—INDIAN SIDE.

From Pamban in the south to Muthupet on the north, this region has a very distinctive type of fishing canoe. It comes into the class of outrigger canoes, but instead of stability being obtained by a float boomed out on one side, the outrigger consists of a long and heavy plank laid athwart a dug-out canoe or a carvel-built boat (both are employed), so that each end projects out-board a con-

siderable distance on either side. By loading the projecting section on the weather side with one, two, or three of the crew, a very efficient counterpoise is obtained.

Two main varieties exist, the southern form employed from Rameswaram in the south to Ammapatnam, halfway up the west side of the bay, and the northern which is seen chiefly at Adirampatnam, Muthupet and the neighbouring villages on the northern shore. The hulls of the former may either be dug-out canoes or, when large, carvel-built plank boats of the same general form. The rig is a square-headed lug, set on a mainmast stepped a little forward of amidships. The outrigger in these consists of a long plank of heavy palmyra wood stayed only by a shroud on either side, led to the mast-head (fig. 8). In any but the finest weather the lee shroud is

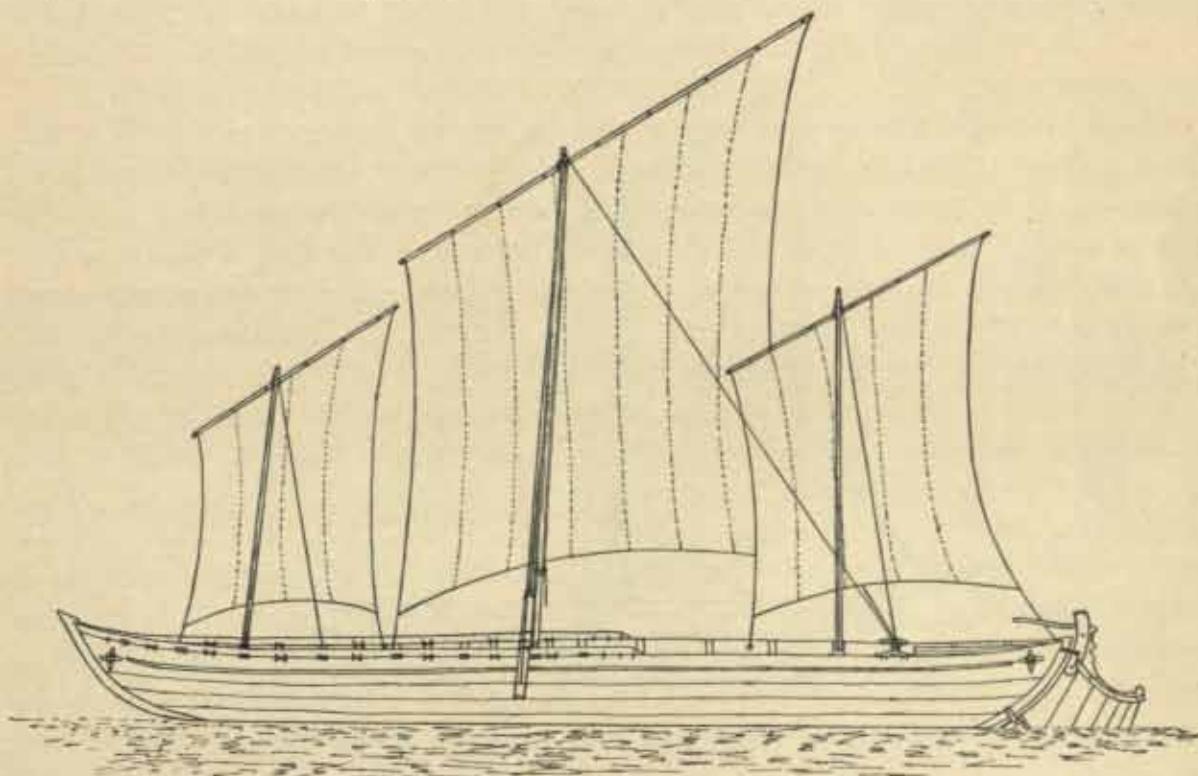


FIG. 9.—A large Muthupet balance-board boat. Palk Strait.

transferred to the weather side of the outrigger plank which then has two shrouds—one at the far end, the other some distance inwards. At the same time the lashing of the plank being loosened, it is run out some distance further on the weather side, giving a lop-sided appearance but increasing the counterpoise leverage. The shrouds give grip to the men stationed on the weather end of the plank.

In the northern varieties, for they differ considerably among themselves in detail, the hull is usually narrower and longer than in their southern sisters, while the majority have a quaint three-masted rig that separates them decisively from any other Indian coast craft. Those of Muthupet, called *välä väthai*, are the longest in this locality and instead of being dug-outs are narrow carvel-built boats of canoe form (fig. 9). The average length is 43 feet, with a beam of $4\frac{1}{2}$ feet; depth $2\frac{1}{2}$ feet. The crew consists usually of five men.

Of the three masts the short foremast (13½ feet long) is stepped right in the bows, the mainmast of 22 feet a little forward of amidships and the mizzen (14½ feet) fairly far aft. Only the mainmast is furnished with stays, one on each side to the projecting end of the balance board and one aft. The sails are square-headed lugs. The balance board, *kadisu*, about 17 feet in length, is a plain plank as in the southern forms; according to the nature of the weather some of the crew, in emergency the whole available four, stand outboard on the weather section to prevent capsizing. As the bottom is rounded and without keel owing to the shallowness of their muddy home river, leeway is counteracted by a useful-sized leeboard; with a good wind these long narrow boats under full sail are accounted the swiftest in

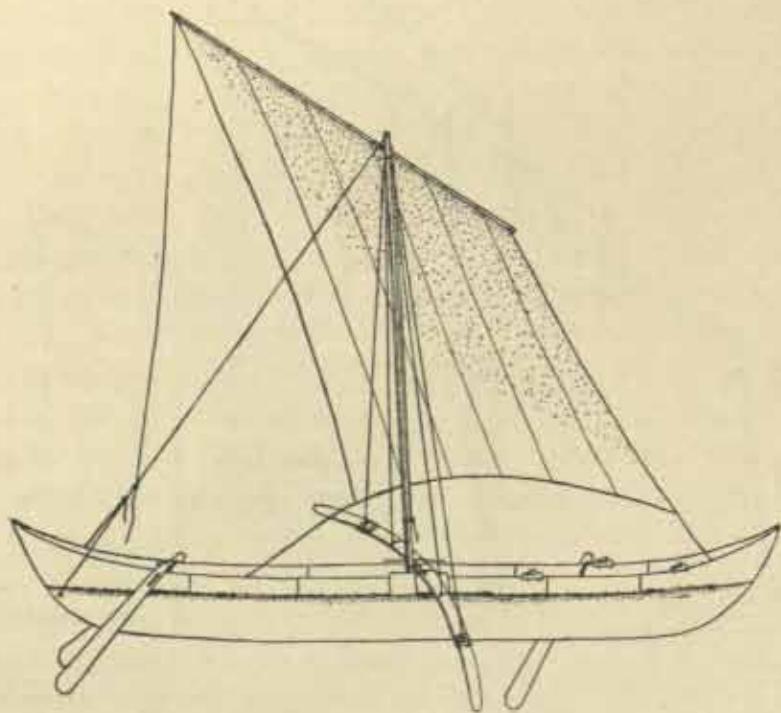


FIG. 10.—An Adirampatnam fishing canoe.

these seas. The rudder is large and powerful, attached by pintle and gudgeon at the lower end and by a coir lashing below the tiller.

Nearly 200 of these boats hail from Muthupet and the adjoining villages. Some owners leave them bare of paint, while many paint the hulls any colour from gaudy green or blue to sombre black and then ornament the whole length of the sides with crude and conventional devices; the most frequent are diamonds, flags, flower sprays and birds, roughly and inartistically executed, and wholly without vigour or spirit.

Their occupation is that of net fishing but the lure of the pearl sometimes attracts a few to the Ceylon pearl fishery, where their peculiar rig and long narrow hull and curious ornamentation render them conspicuous.

At the neighbouring port of Adirampatnam the fishing boats are generally

shorter; the majority are dug-outs fitted with wash-strakes and balance boards and while they occasionally use three masts as at Muthupet, they usually employ the mainmast only (fig. 10) and less frequently a mizzen in addition. The characteristic features are the use of a pair of quarter steering-boards instead of a fixed rudder, and the employment of a compound balance board.

The former have the shape of lee-boards; one is attached on each quarter by a loose lashing passed under the end of the sternmost thwart. The steersman sits right aft on a short decked space and manipulates the quarter steering boards with his feet. The sea for a long distance from Adirampatnam is very shallow and muddy, rendering the use of a fixed rudder troublesome, hence the survival of a peculiar variation of the quarter paddles used before the invention of the fixed rudder. In addition a leeboard is also employed by all these boats.

The balance board or *kadisu* is exceptionally long. In the largest boats, which run to 37 feet in length, it attains fully 34 feet in total length (fig. 11). Unlike all the balance boards hitherto described it consists of three sections, a median portion 19 or 20 feet long laid athwart the boat immediately in front of the mainmast, with a terminal flattened or bladeshaped section 6 to 7 feet long, added at either end. The latter is thinned and broadened at its further end and slightly twisted, so that the forward edge is depressed a little. The splicing is done by overlapping the ends, which are secured in place by (a) a stout square peg passed through both in the centre of the splice, and by (b) a rope lashing tightened by means of a Spanish windlass. Usually two side stays pass from the mast-head on each side to the balance board, one being attached a short distance outboard, the second where the terminal blade is spliced to the main plank. In others only one stay is used on either side. In all other boats the balance board is heavy and straight; here it has a graceful droop downwards on either side; its position is permanently fixed and there is no jockeying with it in rough weather beyond the loading of the weather section with one or more of the crew. All the attachments of the balance boards both to the gunwale and to the blade terminals are made by means of the tourniquet device described on p. 161.

The plank-built canoes, *pälägai kätu vättai* (fig. 11), are as nearly similar as they can be made to the dug-outs. Sometimes they have a second and shorter balance board, about seven feet long, abreast the mizzen mast; this has no stays led to the outboard ends, and none of the crew ever perch upon the weather end as they do in the case of the main one. Even in the case of the latter there is less recourse to loading it with men than in any other form; the principle of the balance pole is here most perfectly utilized.

The dug-out form is fitted with a high wash-strake, about 9 inches deep, sewn to the slightly tumble-home edges of the dug-out gunwale.

In Adirampatnam there are about 90 of these boats, 60 being dug-outs, the remainder plank-built. The size of the latter ranges from 18 to 37 feet, with a beam between 2 and 3 feet and depth of $2\frac{1}{2}$ feet. Very light draft is necessary; before the shore is reached long stretches of mud have to be passed. Usually each boat has its

own channel home ; at low water these long channels, 2 to 3 feet wide, make the mud flats look like a great railway yard with many sidings.

In the shelter of Point Calimere is a little port called Kodikarai, once of much importance in cross channel traffic with Ceylon, now practically forgotten. It is however an important fishing centre as the fine fishing grounds of Palk Strait are most conveniently reached from here. On the beach we see craft of notable form, the one a heavy transom-sterned cobble used in fishing, the other, one of the most peculiar boat survivals in India ; at first sight it is liable to be taken for an overgrown and antiquated form of the smaller fishing cobble. It is in reality the largest and heaviest of any balance-board boat surviving in India (fig. 12). Its local name is *källä dhoni*, which

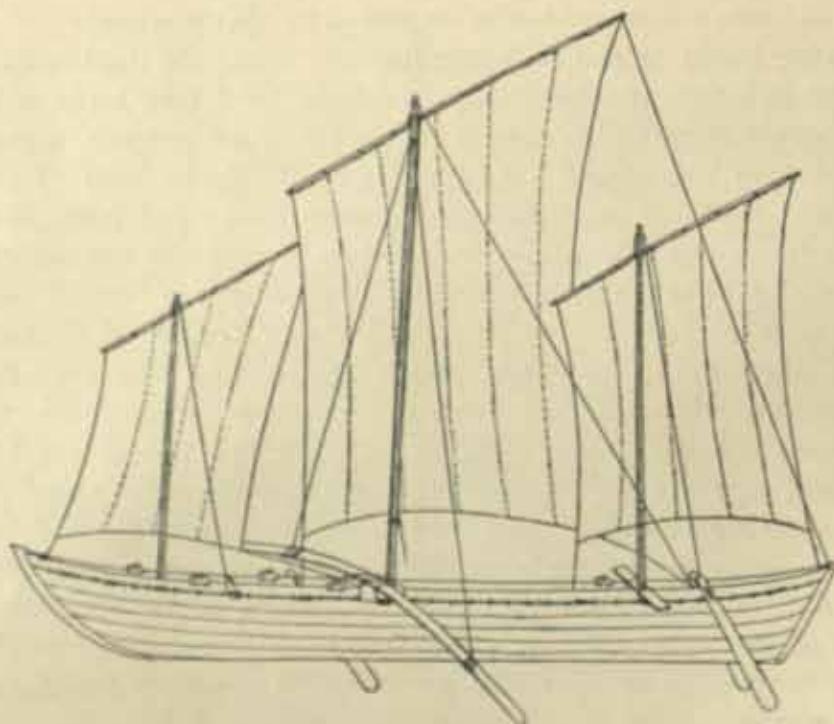


FIG. 11.—Three-masted balance-board boat of Adirampatnam (Palk Strait).

being interpreted means "thief-boat" ; the only explanation given for this name is that "like a thief, this boat runs very fast."

The hull is of clumsily built carvel form, the fore end curved, with fairly heavy bows. Aft is a low decked-in poop, a foot or so higher than the waist. The stern is of transom design, and is nearly vertical, but instead of the powerful rudder being hung on the sternpost in the usual fashion, the latter is built out at right angles to the stern with thick planks, heavily strengthened with stout battens, to a distance of about four feet. Upon the posterior edge of this is hung a very large rudder, of the heavy and clumsy type characteristic of river and canal craft and seldom seen in sea-going vessels. The rig consists of three squarish lug sails borne by three masts. The very short foremast, only 10 cubits in length, is fixed without stays right in the bows,

with a well-marked rake forwards; the mainmast stepped amidships is 30 cubits long while the mizzen mast of 28 cubits in length rises from the fore side of the poop. Both the latter masts are almost vertical. The outrigger is of the balance-board type seen in the southern Palk Bay fishing boats, differing however in being relatively much shorter; it consists of a heavy palmyra plank laid athwart the gunwales; it projects a few feet outboard on each side.

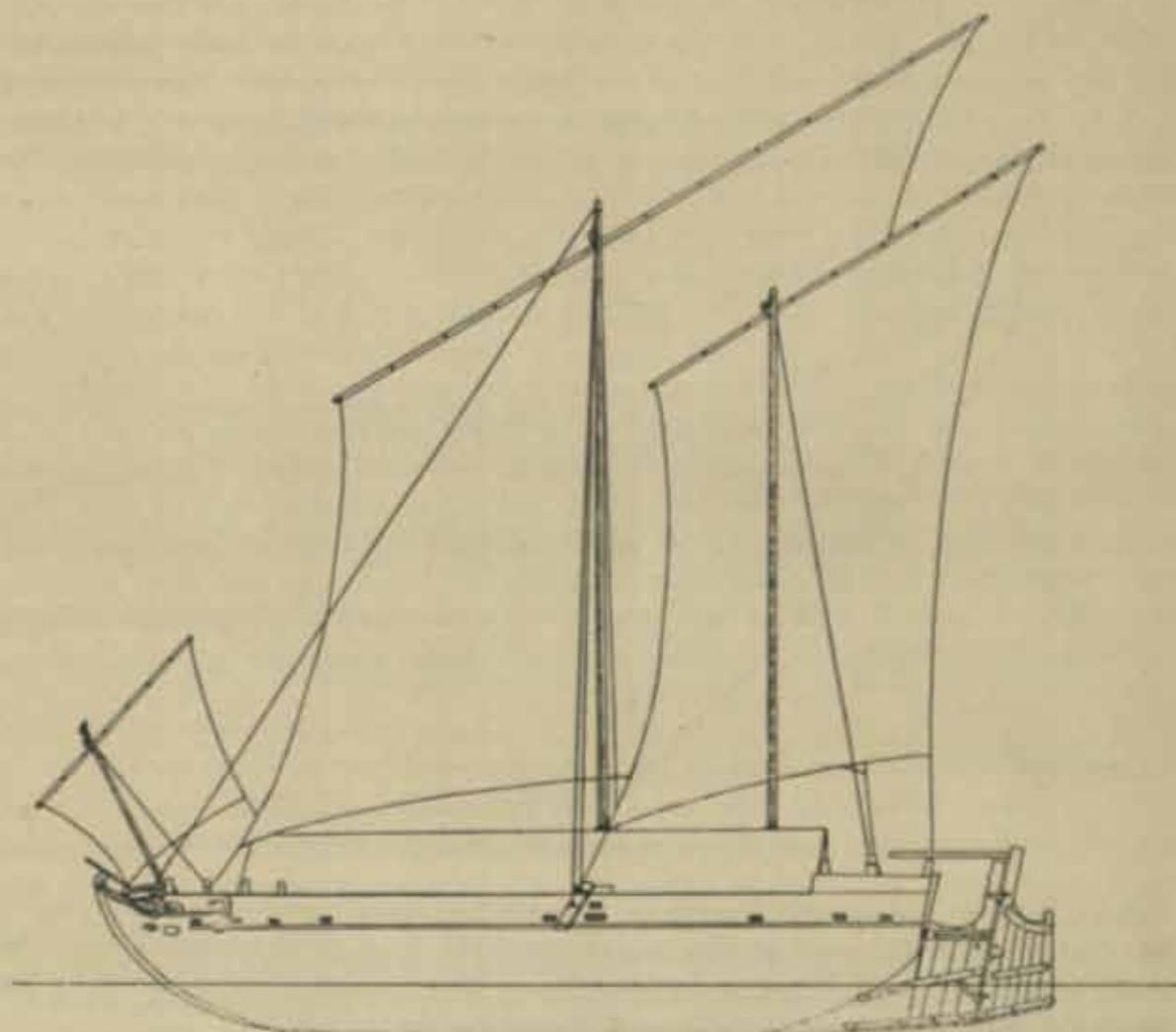


FIG. 12.—Kalla dhoni of Kodikarai, Point Calimere.

Some of the few remaining boats show a peculiar style of decoration such as is seen nowhere else in India. Upon the hull, which above the water-line is thickly coated with black pitch, a number of vertical white lines are spaced at intervals of about a foot apart, forming squarish compartments. In each of these, between the water-line and the gunwale the impression of a hand in white is seen. On the largest of these boats there were 25 of these hand impressions on each side. In addition, upon the transom stern a white disc occurs on the starboard side, a white crescent on the port—representations of the sun and moon. The owners who call themselves Kara-

thurai Vellas claim to be a branch of the great Vellala caste with whom the custom is prevalent of marking their doors with hand impressions to avert the evil eye. Of still greater interest is the survival of an eye carved upon either bow, followed by a small square containing the name of the patron goddess of the owner—in the cases noted Amman—surmounted by the Hindus' propitiatory sign of ∞ , *pārāvi* (पारवी) or "horse" being added—evidently an offering of the vessel to the goddess honoured as her horse or vehicle (text-fig. 13 and pl. vi, fig. 3). Be it noted that the only survivals of the use of "eyes" on the bows of sea-going boats in India and Ceylon are the present instance and that of the Jaffna dhonis of Ceylon. The pictures of a three-masted ship and of a Royal barge on the walls of the Ajunta caves (A.D. *circa* 600 A.D.)¹ show that this custom was in use formerly—probably habitual. The

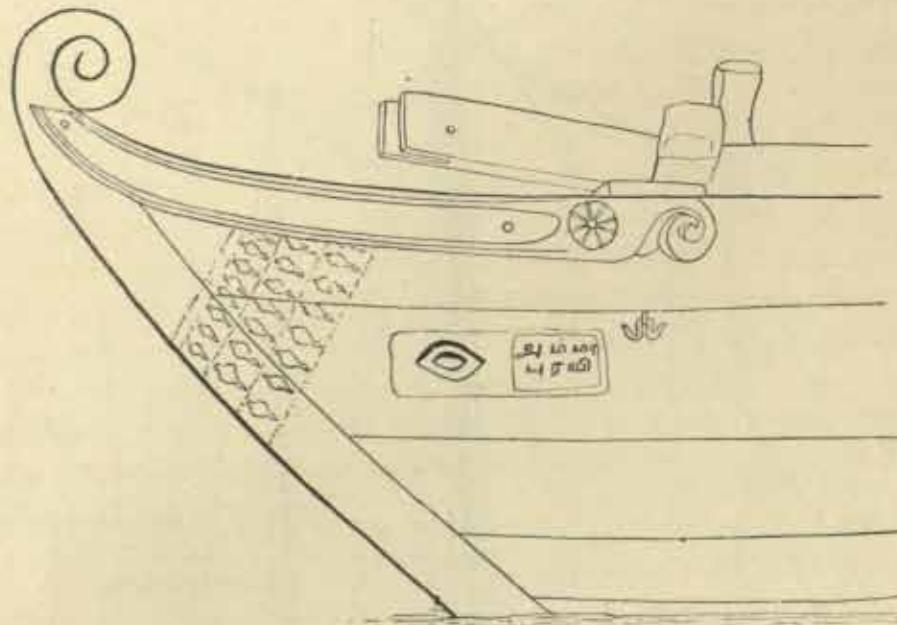


FIG. 13.—Kalla dhoni showing an oculus and inscription incised on the bow.

Greeks, Romans and ancient Egyptians followed the same custom, and although it has died out in India save at this out-of-the-world spot, it flourishes among the junks and sampans of China and Indo-China. The custom is not followed by the peoples of Malaysia—possibly because of Muhammadan influence.

Eyes are also fixed upon the bows of the small coasters of the dhoni type owned by Hindus in the north of Ceylon. In this case the wooden eye (pl. vi, fig. 2) is carved separately and then nailed to the hull; in the Indian kalla dhoni it is carved in the planking of the bow. The Jaffnese Tamils, long isolated in the north of Ceylon, are noted as having retained many archaic Tamil customs long since lost by their continental kindred and as employing in ordinary speech a form of Tamil closely approaching the classical; the likelihood therefore is the greater that their local vessels retain more archaic characteristics than those of ports more open

to outside influences. The same inference may be drawn regarding the Point Calimere *kalla dhonis* which are employed solely in traffic with the north of Ceylon. The latter also are manned by devout Hindu crews, who are accustomed to worship at the shrine of Mari Amman in Kodikarai after each voyage is safely accomplished.

In special danger or storm the seamen call upon her for help, shouting Amma!, Amma!, and vow offerings (of money) that they may reach shore in safety. Usually the money vowed is tied in a cloth and nailed to the mast then and there. A Brahman officiated in the temple as *pujari* at the time of my visit; in the comparatively recent days when these dhonis were numerous, the Amman temple was accounted rich—so regular and continuous was the stream of offerings.

In the days when rail and steamer traffic had not bitten deeply into the coast trade, these *kalla dhonis* ran between Kodikarai and Kayts, the little deep-water port of Jaffna in Ceylon. As recently as 1886 they were busily employed in ferrying passengers and cattle across to Ceylon, and a writer describing the harbour of Kayts in that year ("Ceylon Literary Register," Vol. I, p. 24) records seeing about thirty of these boats moored alongshore.

They carried passengers for as little as 12 annas each, to and from Ceylon, a low rate that encouraged much coming and going, so much so that many Jaffna shopkeepers and tobacco growers living at Vedaranniyam, being able to pay weekend visits to their families in Ceylon, preferred to leave them there rather than transplant them to India. Were the present Ceylon quarantine restrictions to be removed, with the opening of the railway to Vedaranniyam, it is probable that this old and natural route for traffic between Ceylon and the Coromandel coast would revive and bring fresh prosperity to the neighbourhood of Point Calimere.

THE EAST COAST.

Along the whole of the East Coast of India the true catamaran is the characteristic fishing craft. Except for the use of big sewn-plank boats used in shore seining and of various forms of backwater and river boats which ply in the estuaries and occasionally venture seawards, the catamaran is dominant the moment Cape Calimere is turned. The surf-beaten sandy coast line that runs with few interruptions from Tanjore to Orissa scarce knows any other sail but the brown triangle of these sea-going specialized rafts; that their Tamil name, for once purely descriptive—*kathu maram* or "tied logs"—has become an English word bespeaks the uniqueness of their design. Our ancients, without previous experience of such weird craft, having no name whereby to speak of them, had perforce to use the native term and this has persisted, as the craft itself will persist for centuries to come as the only possible type for use on such an exposed and harbourless coast.

Two distinct types of catamaran exist, the finer and more elaborate model being found on the Coromandel coast, from Cape Calimere to the delta of the Kistna; the other, more primitive and less efficient, along the coast further north.

The former type is the catamaran at its highest possible state of development—the furthest possible evolution of the raft idea that shares with the dug-out the honour

of being primitive man's earliest conception of a means to gratify ambition for a life afloat or, more prosaic, to enable him to cross a river in pursuit of his enemy or to steal away in flight.

But the Tamil sea fisherman has travelled far as a designer since those days, and to-day the fishermen of Madras and Pondicherry have more variations on the type, adapted for different methods of fishing, than can be seen in true boat designs in harbour at any English or Scots fishing port.

The general type consists of a variable number of definitely shaped logs of definite relative proportions, tied together raft-wise in a certain order recognised as

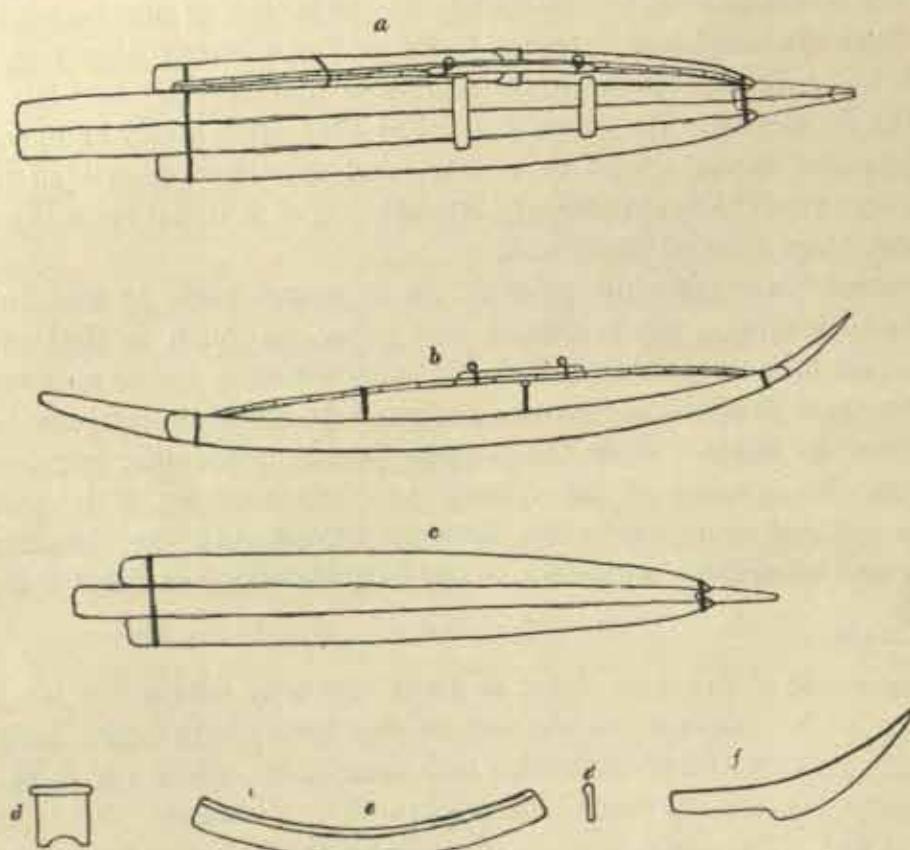


FIG. 14.—Madras catamarans. *a*, a Periya-maram from above; *b*, side view of same; *c*, a Chinna-maram; *d*, stretcher of rowing rail; *e*, paddle; *f*, section of same; *f*, a stem-piece.

correct by long-established usage. To these main elements are added a number of accessory pieces in the shape of stem points and sometimes a rowing-rail.

Catamaran being understood as a raft of logs, the inference is natural that it must be inherently clumsy in its form, broad and more or less formless. This is by no means the case with the Coromandel catamarans which possess very considerable elegance in their proportions and often show quite pretty curve lines. Figures 14 and 15 are witness to this.

The prettiest and best developed form is seen in the large *periya maram* form used in conjunction with the *thuri*, *edu* and *painthe valai* nets. This consists of four long,

and narrow logs carefully fitted together side by side and securely lashed in position fore and aft. The middle pair project aft about four feet beyond the outer logs, forming a conveniently narrow seat for the paddling steersman who kneels there squatting on *the soles of his feet*, the feet being stretched backwards straight out along the plank. At the fore end where the four planks end at the same level, the two outer ones are worked down laterally leading forwards and the end is then finished off in a sharp upwardly curved prow by the addition of two narrow wedge-shaped stem pieces. The total overall length is 25½ feet with an extreme breadth of only 3½ feet (fig. 14a and b).

The device to permit the catamaran to be rowed like a boat is most ingenious. Along the port side a rowing rail made of two bamboos is fixed in the following manner: the fore ends are inserted under the lashing around and securing the fore-ends of the logs, while the aft ends are secured loosely within a ring of rope passing also round the outer plank. To raise the bamboo rail to a proper height and maintain it there rigidly, a plank stretcher, 10 inches high by 8 inches wide, shaped on its lower edge to fit the curved contour of the catamaran log, is introduced and wedged upright (fig. 14d). A short length of stake to prevent the wearing through of the bamboo rail is lashed upon the latter and in this are two coir loops to take the rowing paddles. An ordinary crew consists of three men, but on occasion an extra man may be carried. In this case two *row* on the port side, one paddles forward on the starboard bow, and at the stern is the squatting steersman, plying his paddle right or left as required. The rowers have each a little transverse seat resting loose in a groove on the bottom of the catamaran.

When employed in working the *thūri valai*, proper to this type of catamaran, a second and smaller canoe called *chinna mārām* (small logs) is required to assist (fig. 14c). This is of simpler design, consisting of 3 logs only and of one single beak-shape stem piece. The middle plank projects some foot and a half aft beyond the others. No rowing rail is present. The overall length is 21 feet, the width 2 feet 4 inches. The crew consists of two men.

When there is a favourable wind going to or returning from the fishing ground, the larger of the pair of *thuri valai* catamarans puts up a small lateen sail rigged in the manner already described as used in the boat catamarans of Cape Comorin. As with the latter, the smaller of the pair ties up alongside the larger one which alone carries mast and sail.

For drift net fishing the *irukka maram* variety is chiefly employed (fig. 15). This is very similar to the *periya maram* but consists of five logs instead of four, the middle or odd log being the longest, projecting aft some distance beyond the inner lateral ones which in turn project beyond the outer lateral pair. The stern ends therefore in a series of steps. The beaked prow is formed of three stem pieces whereon is hooked a single-fluke wooden anchor with stone-weighed shank. A rowing rail is present and mast and sail of the usual type are fitted. This variety is used singly and not in pairs or double pairs as in *thuri valai* and *edu valai* fishing.

A simpler and shorter form constructed of five logs unprovided with any beaked

prow and equally without sail and rowing rail is used in line-fishing and hence is called *thundil-maram* or "hook-catamaran" (fig. 16).

Last to be mentioned is the great *kolamaram* of "flying-fish catamaran," in some ways the variety of greatest interest. It is the largest form of catamaran used on the Coromandel coast, where it is found chiefly along the shore-line of the Tanjore district. Only used during the clear-water season of July and August, it is more of the primitive raft and less of the carefully designed sea-craft than any of the beaked forms above described. To construct one a couple or even three *periya marams* or *erukka valai marams* are untied and (usually) seven of the longest logs are selected and tied side by side, rigidity being obtained by lashing two cross poles over each end. A stem is formed as in the *periya maram* and other forms by lashing five stem pieces at the fore end. Two short masts each hoisting the usual triangular catamaran sail, are stepped in holes in the outside log of whichever side happens to be leeward, one forward, the other two-thirds aft, and with

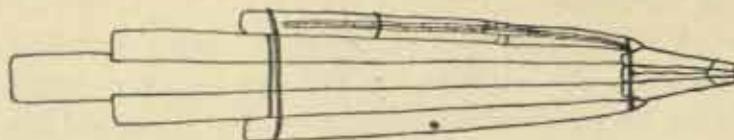


FIG. 15.—An Irukka-maram, Madras.



FIG. 16.—A Thundil-maram, Madras.

sails hoisted, this queer craft, manned by seven men, boldly not to say rashly ventures out of sight of land, heading for the *kala pani* outside of the 100-fathom line, where alone can shoals of flying-fish be found. The amount of food and water taken is exceedingly limited and if the shoals are not found within the first day, the men have no option but to turn and set a course for home. Sometimes they make such an amount of leeway in spite of the use of two large leeboards that they fetch the coast 20, 30 and even 50 miles to the north of their port of departure, and if they happen to have a haul of fish aboard, its condition is then fit only for manure. But the profits often bring a great recompense and a fisherman learns to take such risks.

North of the Kistna and Godavari deltas and employed almost entirely by Telugu fishermen, a more primitive and simpler form of catamaran is in use than satisfies the Tamil fishers of the Coromandel Coast. On the shores of Ganjam, it consists essentially of five logs brought to a narrowed point at the forward end, where two accessory stem pieces being added give a sharp beak point as in the

best Tamil types (fig. 17). Aft, the craft is abruptly truncated, the logs being cut off at the same level. Instead of being lashed together with rope, the logs are pegged together permanently, the comparatively small size of the craft permitting the crew to carry it up the beach without separation of the logs. The three median logs usually are the only full length pieces used, the side ones being made of pieces of old logs pegged on to give the required curve to the side. Upon each of the side logs a deep weather-board set on edge is fixed, to give some slight protection to the crew and their gear. The fore end of each board butts against the aft end of the stem piece of its own side, giving a clear run fore and aft. Further south, on the coast of Vizagapatam, the size is larger and the workmanship and quality of the timber distinctly superior. In the peculiar craft of this region, called *teppu* in Telugu, we find a stage intermediate between the Coromandel or Tamil catamarans

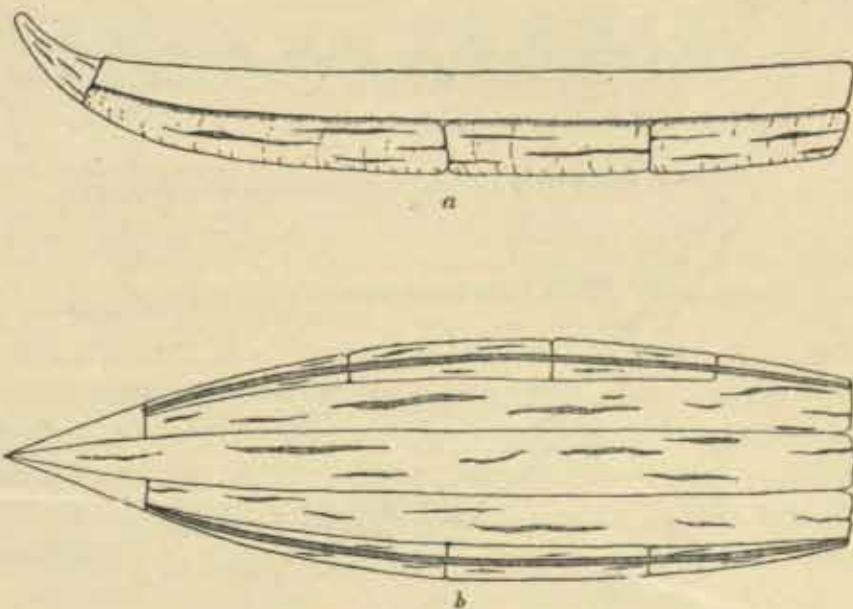


FIG. 17.—A catamaran from the Ganjam coast.

a, side view to show weather-board.
b, view from above.

and the pegged-together catamaran rafts of Ganjam. Here the hull consists of two halves lashed together fore and aft when in use. Each half consists of a long log bearing a washboard sewn on upon the outer edge, and with a pointed beak-piece pegged upon the fore end. On coming ashore the rope lashings are cast off, whereupon the two halves fall apart, for ease in carrying up the beach. In the largest sizes, a median log is added to give greater beam. This is held in position by means of the fore and aft lashings when in use; in such, the catamaran falls into three main pieces when unashed. The median log has also a pointed bow piece, but this is loose and not pegged on as is the case with those of the lateral sections. A small loose rudder is used when sailing, let down aft between the ends of the main logs. Two men form the usual crew of one of these craft.

Alongside of the catamaran is the so-called masula boat of Europeans, but

known as *padagu* or *salangu* among Coromandel fishermen, a large and clumsy open boat used in shooting shore seines, and also as a cargo lighter. Its range extends along the whole of the East Coast northwards of Cape Calimere. On the Coromandel Coast it is distinctly short in proportion to its length and depth, a rather small one measured at Pondicherry being 28 feet long, 8 feet beam and 4 feet deep. In the Vizagapatam and Godavari districts it often runs longer and more elegant, frequently ranging to 40 feet and even upwards in length, with beam and depth about the same as in the southern districts. As the masula boat never goes far from shore, mast and sail are not used; a crew varying from 8 to 12 in number perched insecurely on thwarts far forward, provide the motive power with long paddle-sweeps not less than 12 feet in length; steering is done with a very long and powerful paddle suspended in a coir grommet from the projecting head of the stern post.

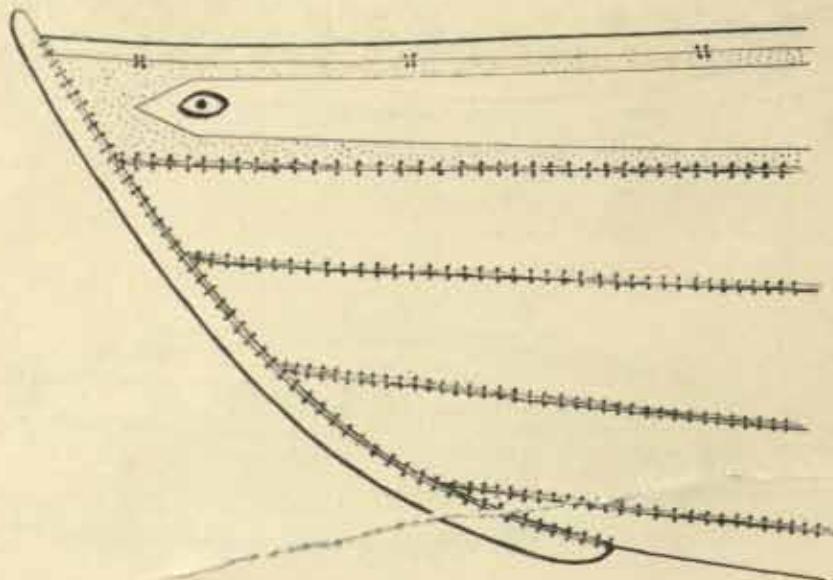


FIG. 18.—Fore end of a Madras masula boat, showing the method of stitching together the planks; also an oculus painted close to the stem.

No iron is used in the hull, the planking being sewn in the usual surf-boat fashion already described in the case of the Ceylon outrigger coaster. A narrow keel projecting about 2 inches is usually seen, no bulk heads are used, stem and stern are both raked considerably and both are somewhat buff in their curves. Freeboard has to be very high as they have to pass through heavy breakers and in consequence the loads they carry are very light compared with their apparent capacity.

An oculus is sometimes (rarely) painted on the bows at Madras (fig. 18).

In the seining masulas working in the neighbourhood of Uppada, Vizagapatam district, this type of boat attains its greatest development, both in regard to size and economic importance. There it is esteemed the most valuable asset of fishermen as these men have vigorously developed the use of the shore seine and without roomy boats would be unable to carry and handle the great length of net requisite to effective operations on a large scale.

These Vizagapatam fishing masulas are usually decorated along the sides with two rows of sloped panels of alternate black and white, those of the upper row slanting opposite to the inclination of the lower ones (fig. 19).

The delta of the Godavari furnishes a notable exception to the universality of the catamaran and the masula boat upon the East Coast. In the seaward creeks of this great river a host of peculiar fishing craft, called shoe-dhonis among Europeans, ply their trade. The name well describes their appearance—wide and flat

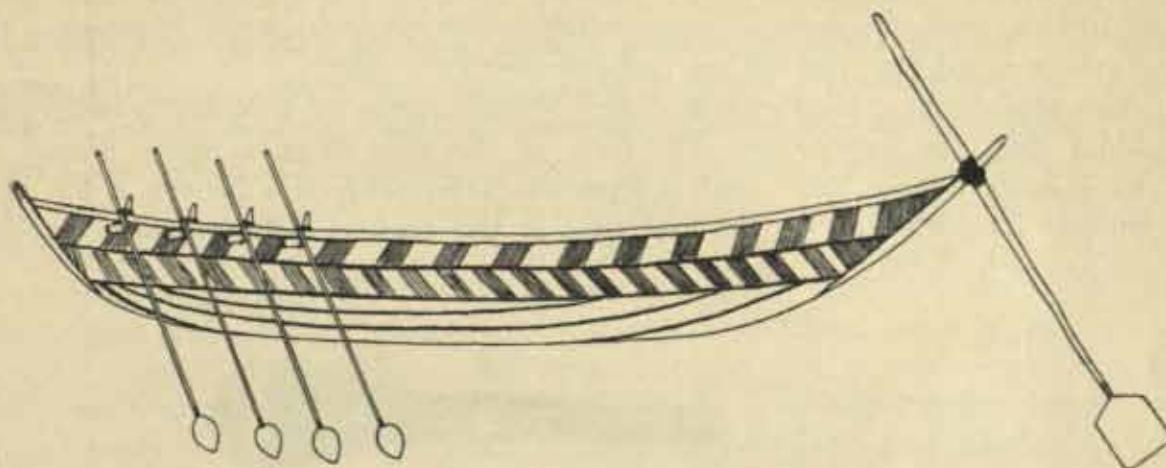


FIG. 19.—A large seining masula boat, Uppada, Vizagapatam.

forward with a sharp stem, they narrow greatly aft and have a square transom stern (fig. 20). The fore part is decked in, and as the aft portion, roughly two-thirds of the length, has tumble-home sides, and is also decked in for three feet from the stern, the well is narrow and restricted. It is protected by a high transverse coaming where it meets the fore-deck. The steersman squats on the little deck aft and steers by means of an oar about 12 feet in length working in a wooden rowlock nailed to the centre of the stern. This oar is also used in skulling when there is

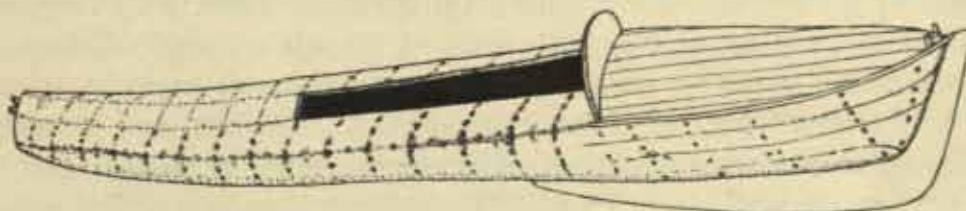


FIG. 20.—Shoe-dhoni, Cocanada

no wind. The hull has a deep forefoot merging into a fin-keel 6 to 8 inches deep beneath the mast; the aft portion is nearly flat bottomed, and has almost identical lines as the same part in a skimming hydroplane. Narrow teak planks are generally used for the hull, nailed on ribs of any sort of wood. The outside is kept liberally coated with tar and not with fish oil as in Malabar. The forward decked part is considerably wider than the aft, usually by a foot; in one measured dimensions were as under:—

	Ft.	in.
Overall length	26 0
Forepart, bow to aft side of coaming	8 6
Beam at fore side of mast (at coaming)	3 7
Beam aft of mast	2 8
Depth	2 0

A rather lofty square sail hung from a bamboo yard is used, hoisted to the head of a 19-foot mast set upright immediately abaft the transverse coaming. Its head measures $10\frac{1}{2}$ feet, the luff $14\frac{1}{2}$ feet and the foot 10 feet.

This shoe-dhoni of the Godaveri creeks is perhaps even more distinctly indigenous to India than the catamaran. The form of the shoe-dhoni is quite unique so far as I know among boats, and is especially interesting as I believe I am able to indicate its prototype for the first time in the curious palmyra-palm dug-out

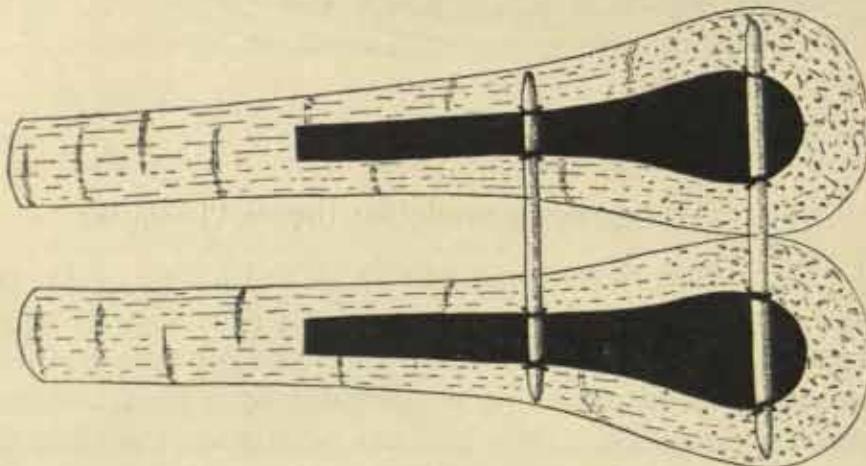


FIG. 21.—A sangādam or double canoe, Godaveri river.

used on the upper reaches of the same river system. These craft frequently used as double canoes, consist of two butt sections of palms roughly hollowed out on one side and lashed together parallel but at some distance apart by means of two bamboo poles passing from one to the other (fig. 21). The butt end of each dug-out being bulbous, one extremity is wide, whereas the other is narrow and truncated as being part of the cylindrical stem. One of these dug-outs copied in planks and with a keel added below the fore end which corresponds to the bulbous butt, gives precisely the design of the shoe-dhoni. As further proving the inland origin of the latter, we have to note its tall mast and high and narrow square-sail, well adapted to top the low banks of river and creek but a poor design for sea-going craft.

These boats are absolutely local, not being found even in the adjacent delta of the Kistna. They are very fast with a fair wind, but are said to be poor sailors when beating in spite of the deep fin-keel and forefoot, a fault due apparently to the type of sail employed.

BACKWATER BOATS.

Backwater boats on the East Coast are generally either dug-out canoes, or rough and usually clinker-built reproductions of that form. The latter are the craft generally used on Pulicat Lake and the Madras backwaters for fishing. The clinker-build is noteworthy as I am not aware of this style being employed anywhere else in India. Iron nails clinched upon iron washers are used for fastening the planks together. These boats remain naked of paint or of oil dressing all their life, so the majority always appear untidy and broken-down. For cargo carrying on the coast canals large undecked barges running to 20 tons' burden are numerous. They are broad and flat bottomed and of 3 to $3\frac{1}{2}$ breadths to length. They are built in the same manner and on the same lines as the fishing boats but with a strongly marked "swim-bow" such as Dutch eelers affect. It is simply a punt bow ending roundly instead of being truncated. The stern is shaped similarly, so, to support the rudder properly, a strong heel has to be run out from the bottom of the boat to support the vertical stern post. These canal boats frequently carry a coach roofing over nearly their whole length, supported on uprights set along the gunwale. The rig is a light cotton sprit-sail triced high up and carried on a fairly lofty spar stepped in a tabernacle above the deckhouse roof. Karimanal at the south end of Pulicat Lake is one of the chief places where these canal boats are built. For convenience, they are constructed upside down and a preliminary to launching is the turning of them right side up!

A considerable number of the Chilka Lake fishing boats are notably larger than those in use on Pulicat Lake; they are simply planked-up boats of canoe model, and are of no special importance in design.

Far otherwise is the novel rig of some of the smaller craft that ply on this greatest of Indian backwaters. Alone of any of the craft we have noticed above, two masts are here used, slender bamboos set up parallel on either gunwale well in the bows. A short stay runs from each to the bow, while another runs from each mast-head to the stern. On the masts is fastened a narrow oblong strip of matting as a sail. To give strength numerous transverse battens are fastened at short intervals. No mechanism exists to hoist the sail which has to be bound to the masts before being set. (Pl. V, fig. 5).

The idea is probably borrowed from Burma, where a double mast is customary on the big river rice-carrier which is one of the biggest and smartest forms of river-boat in the world. In the Burmese boats the two spars are however not fitted parallel but meet at the apex in a manner seen in Egyptian drawings of the third and fourth dynasties.¹

Primitive catamarans made up of any old logs roughly tied together are fairly extensively used by cast-net fishermen on backwaters, particularly in the Tamil districts; the logs are usually old ones thrown out of use by sea-fishermen.

Dug-out canoes of the ordinary kind are not greatly in evidence on the Coromandel

¹ Holmes, G. C. V., *Ancient and Modern Ships*, London, 1900.

Coast backwaters as they are difficult and expensive to obtain. In Vizagapatam district I have seen two or three of the clipper form of dug-outs used in Burma; these were spoils of the sea, brought by the drift which sets across from Burma during the north-east monsoon; a similar one I saw recently at Muthupet on Palk Strait.

For a long time I believed the outrigger canoe to be unknown to the north of Point Calimere; quite recently I found them numerous on a backwater near Cuddalore, where at one place fifteen were seen together; they are also reported as numerous on the Vellar River near Porto Novo. Each is formed of a small dug-out, usually about 16 feet long by 22 inches broad, furnished with an outrigger float of ordinary form boomed out by means of two poles, at a distance of 5 feet from the canoe. They are used generally in conjunction with the casting net; mast and sail are never fitted. This extension in the range of the outrigger is particularly interesting, as we now find it in use at intervals along the coast line lying between Baluchistan in the north-west to a point well north on the Coromandel Coast in the south-east. A small one is also often carried as a ship's dinghy by the coasting dhonis sailing out of the northern ports of Ceylon (text-fig. 5).

SEA-GOING SHIPS ON THE EAST COAST.

Of ships in contradistinction to boats properly so-called many fine examples running from 50 to 300 tons' register were engaged in the Indian coasting trade a few years ago. The baggala and pattamar are run so cheaply that true ships were never able to compete with them on the West Coast. In the Bay of Bengal this competition was not severe, and as there has always been much carrying trade between Bengal and Burma on the one hand and the South Indian and Ceylon ports on the other, a fine fleet of brigs, barques and dhonis found these remunerative runs till the regularity and insurance advantages of steam traffic ran the slow and irregular sailers almost off the sea. Coringa near Cocanada, and Masulipatam, the ancient eastern sea-gate of the Deccan, were the most famous of the old Indian ship-building ports. Some of the small ports on the north of Ceylon, notably Valaveddithurai, and others on the Ramnad coast, also turned out a fair number of medium and small craft, chiefly however of the dhoeni class. Even to-day all these ports do a certain amount of shipbuilding, but the number and average size have become reduced, not on account of lack of skill on the part of the present-day designer and workpeople but solely owing to the difficulty which owners experience in earning remunerative freights with large tonnage sailing vessels, part of the handicap lying in the difficulty of effecting insurance upon cargo carried in native craft.

In the designs of the larger of these craft, European influence has been paramount during the last three hundred years; the models on which the Coringa and Masulipatam builders founded their designs were chiefly the splendid vessels of John Company and the grand products of the eighteenth century French naval shipyards, refined during the past century by the influence of the clipper design that brought sailing ship construction as nearly to perfection as it seems possible to attain. The favourite rigs with Indian builders and shipmasters were those of

the barque, the brig, and the topsail schooner. Even to-day East Coast harbours often contain a goodly collection of wooden brigs and schooners with here and there a barque with high poop and painted imitation gun-ports, that are wholly European of the early nineteenth century in appearance. Of Portuguese influence the larger three-masted Maldivian trader seems the only instance but a most interesting one, as it reproduces for us almost all the outstanding features of the fifteenth century caravels used by Columbus. The Dutch in spite of their skill in ship-building and first-class seamanship appear to have left no trace on Indian ship-designing. Probably both they and the Portuguese did exercise a great deal of influence on design in their day, this being lost or overlaid by British and French design as these powers displaced their predecessors.

Of modern European influence upon boat designing scarcely a trace exists, except in the isolated case of the Pamban dhoni, a transom or square-sterned lugger used largely in ferrying pilgrims to and from Rameswaram island in the pre- viaduct days.

The small coaster class built in the north of Ceylon, generally called Jaffna dhonis, are weatherly vessels running to 150 tons' burden, and deserve particular notice from the many archaic features surviving in their build. Technically known in Tamil as *padagu*, they hail mostly from the little port of Valaveddithurai. The majority are owned and manned by more than usually devout Hindus, the remainder by Muhammadans (Abbas).

Their rig is that of a fore and aft two-masted schooner with enormously developed bowsprit and head sails. Primarily the rig is European—almost the only foreign point about these boats, but in process of adoption the number of head sails has been increased beyond anything seen elsewhere, as many as five jibs being in regular use. Stem and stern are sharp and somewhat raked; the former ends in an inwardly coiled ornamental head in Hindu dhonis, called *surul* (सुरुल), the bowsprit being placed on the starboard side. In Moslem ships, no *surul* is seen, the stem passing forwards to give support to the bowsprit, which here is placed in the median line.

The *surul* in Hindu padagus bears three horizontal white bars painted on the aft edge (Pl. VI, fig. 1); these represent the three ash lines used by Saivite Hindus as their sect mark and the sign of their god. In these boats it has the same significance. Beneath it in a tiny recess in the bows is the little shrine of the god, before which one of the crew, who acts as *pujari*, with the aid of an assistant performs worship daily and in particular before leaving port. On a shelf in the recess a blowing conch and other items of the ceremony are usually kept. In the ritual followed, a lamp is kept alight on the shelf, incense is burned, the conch is blown, a bell rung, a coconut broken, libation made, and plantains and betel offered to the god.

Fore and aft is a short deck ending in each case in a high transverse breakwater, $2\frac{1}{2}$ to 3 feet in height, sloping towards amidships. The waist between is undocked, but is covered in by a penthouse roofing of palm leaves overlaid and strengthened

by closely set palmyra reepers tied down with coir. The aft deck is the larger; on it a small cooking galley and several water barrels find accommodation. In the centre is a small hatchway. There is no poop, the gunwale having a clear run fore and aft. As ship's boats, a small outrigger canoe and a fair-sized catamaran are carried, both useful types for a small coaster with restricted deck accommodation, as they can be taken to pieces and stowed away without difficulty.

As in the Laccadive boats, the hull, here also usually painted, pitched or tarred black, is ornamented with two parallel white lines. In the dhonis the lines are equibroad; at the rise of each bow, they are bent abruptly downwards and pass to the stempost in such a way as to leave a triangular patch of black beneath the coiled prow or *surul*. In the angle or elbow of the two white bands is nailed on a carefully carved ornament in the likeness of a human eye, pupil and eyelids well defined by being picked out in black and white—the eye of the god who has his shrine within the bows. With these eyes, the tindal stated that his ship would be able to avoid danger—without them she would be like a blind man blundering into danger with every step he takes. (Pl. VI, fig. 2).

The dimensions of a typical Ceylon *padagu* from Valaveddithurai are as follows:—

Length between perpendiculars	..	..	100 feet.
Beam	..	..	21 ft. 2 in.
Depth from keel to top of gunwale	..	..	14 feet.
Tonnage	..	..	144 tons.

Muhammadan padagus are similar in all respects save in having no curved prow and having no eyes on the bows.

The Sinhalese outrigger coaster or *yathra oruwa* (*yathra dhoni*, Tamil), hailing from the south-west coast of Ceylon, which, on account of its size, requires mention here, has already been described. In many points—the two pole masts carried, the sharp ends, the palm leaf or bamboo penthouse roof in place of a deck and other details—it shows a great family resemblance to the padagu; probably this Sinhalese type is the original of the latter, the great outrigger having been eliminated by the northerners as they passed the unskilful and timid stage of long voyage coasting wherein the Sinhalese still remain.

THE MALDIVE ISLANDS.

No people of the Indian Ocean are the superior of the Maldivians as boat-builders, fishermen, and sailors, though for neatness of finish and beauty of line of their smaller craft, the neighbouring Laccadive islanders excel them.

For shore work the Maldivians formerly relied largely upon outrigger canoes and boats, but these are seldom seen now-a-days, handsome little beamy skiffs having largely replaced them. Alike with all those of the Indian mainland, the Maldivian outriggers have the booms connected directly with the float; all are of the single type.

The most numerous craft in these islands are bonito-fishing boats (fig. 22). These are very handsome and wonderfully speedy boats showing, in the type used at Minicoy,

a curious combination of fore and aft and square sails. These boats are of light draft in order to pass through the shoal passages in the encircling reef into the safety of the lagoon. The forward end rises easily and gracefully to a moderate extent, ending in a slender upturned prow; the stern is low and rather full to provide the better for a large platform not only decking in the extreme aft portion but projecting outboard to a considerable degree. A single tall mast with little or no rake is stepped slightly forward of amidships in a simple tabernacle, and when lowered rests on the hollowed-out top of a broad plank set upright on the aft platform to act as a crutch. The rig is peculiarly hermaphrodite, there being a high mat square sail hoisted on the

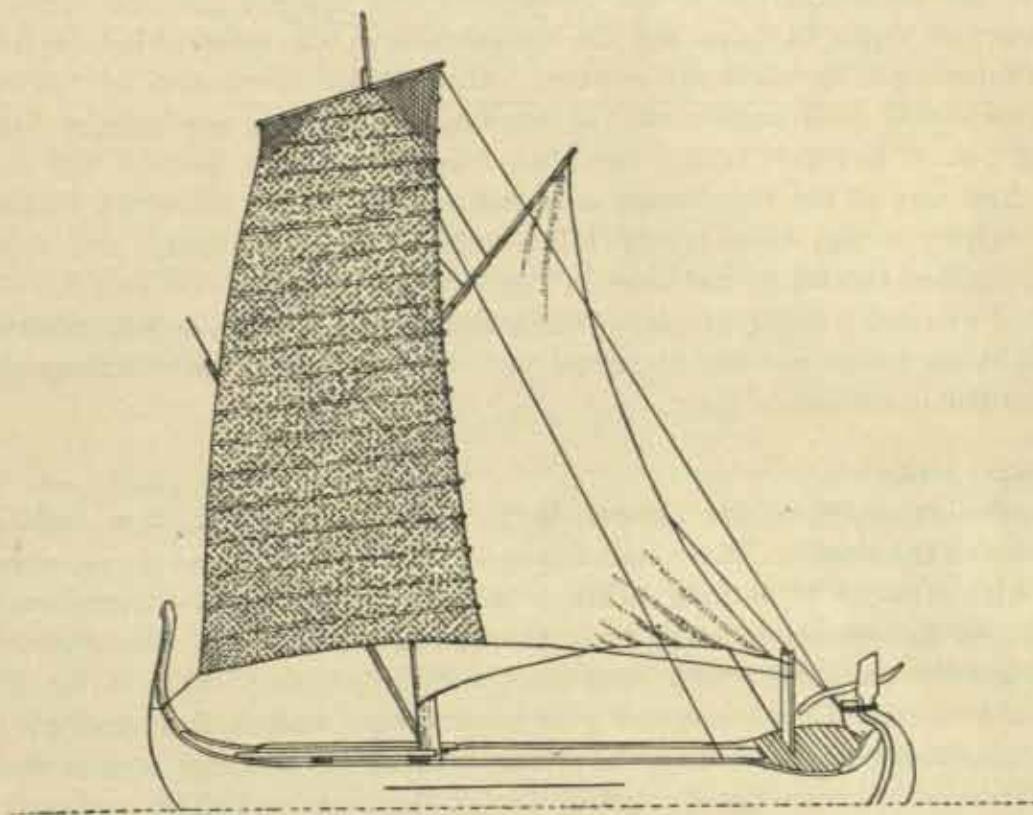


FIG. 22.—A bonito fishing-boat, Minicoy Island.

foreside of the mast while abaft on the same spar is set a fore and aft thin cotton main sail.

The object of the stern platform is not to give a commanding seat to the steersman but is primarily built to afford standing room for the crew to jig for bonito when they get among a shoal of these fishes. The hull is open save for this fishing platform and is divided by numerous bulkheads, as some of the compartments function as wells for the live-bait carried.

A somewhat similar boat, of larger dimensions, especially as regards beam and depth, is used in traffic between the islands and Ceylon; it is usually decked over with somewhat elaborate and comfortably arranged deck-houses in the better class, while in others these structures are largely replaced by well-built cadjan penthouse

covers, efficiently protecting the cargo. These boats dispense with the fore and aft gaff sail used by the Minicoy bonito boats, but often add a small topsail in fine weather. They have speed and power and form a fine class of sea-boat. Formerly the smaller Maldivian boats of this description running to Ceylon employed an outrigger to give additional stability. The present build is more beamy and deeper and the crew find they can now safely dispense with this clumsy contrivance.

For many years the Maldivians have maintained regular trade with Chittagong and other far-off ports, by means of large traders running to one hundred tons or more in size. These vessels are very remarkable as they perpetuate, in their main features, the characteristics of the Portuguese and Spanish caravels employed by Columbus and Vasco da Gama and the conquistadores who followed in their footsteps at the beginning of the sixteenth century. These Maldivian traders are fully decked with considerable deck houses aft and amidships and a big overhanging forecastle carrying a short foremast raking forwards, hoisting a square foresail well over the bows. The rest of the rig consists of a tall mainmast and fair-sized mizzen; the former carries a big main square sail set high up with topsail and occasional small topgallant sail, while the latter is rigged with a fore and aft gaff sail. In the last detail we have a departure from the lateen mizzen of the fifteenth century ship. The Maldivian design has also dispensed with the lofty poop and transom stern so characteristic of mediaeval ships.

LACCADIVE ISLANDS.

The sailing craft of the Laccadives lack the diversity of form seen in the sister isles to the south. The islanders are of a different race and are home-keeping people with a narrower outlook in life, to whom a voyage to the adjacent mainland, to Calicut or Mangalore, to carry their simple island produce of tiny coconuts and amber-coloured coir fibre, with sometimes a little sun-dried fish, is the limit of their world travel. They have no elegant bonito boats, and no three-masted traders, notably no outrigger boats. They have one type alone, but that a most handsome one. It is a little lateen-rigged modification of the type of Indian pattamar, combining the simple bow of the southern type with the lofty highly ornamented poop of the northern or kotia design. The lines are particularly sweet, sweeping forwards in graceful curves to the overhanging bow, ending in a curious upright stem piece carried in the same way as the more elaborate ornament on the prow of a Venetian gondola.

The poop cabin is large and roomy with a curious stern gallery built out aft and on the quarters exactly as in many of our present-day naval vessels. The hull is painted or rather tarred black, relieved by two fore and aft white bands, the upper wide, the lower narrow. The sides of the lofty poop and of the stern gallery are decorated with elegant arabesques in white, usually in panels with ornamental borders. No two pattamars are decorated alike; the designs vary greatly and bespeak a strong innate artistic sense in the islanders. The hulls of these boats are put together entirely without nails, the planks being sewn together along the edges with coir twine,

a device alike economical and of practical value in imparting elasticity invaluable to boats always liable to ground when entering the shoal entrances of the home lagoons.

The rig is a single medium-sized lateen sail carried on a stout mast well raked forwards; sometimes a small mizzen, also lateen rigged, is added.

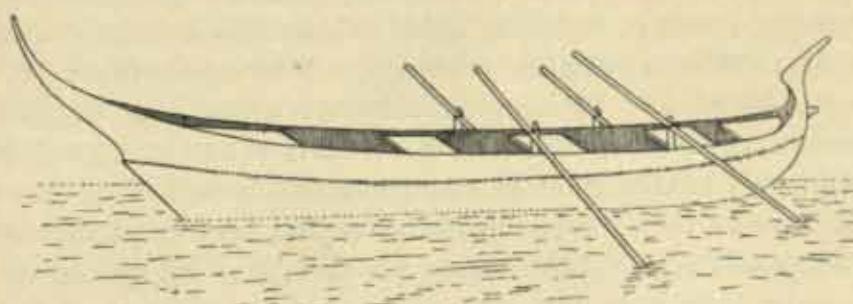


FIG. 23.—A reef-boat, Laccadive Islands.

The island fishing boats and skiffs are built on the same general model save that the stern is generally rather low; the bow has often an exaggerated rise terminating in a high upturned pointed beak (fig. 23).

THE ANDAMAN ISLANDS.

In this group, thinly inhabited by wild Negrito tribes who are usually accounted the very lowest in civilization of all existing races of the human species, it is surprising to find these people habitually employing both the primitive dugout and a well-designed single outrigger canoe.

The simple dug-out is the type adopted for their larger-sized canoes; the outriggers have normally smaller hulls fashioned on identical lines. The shape of the dugout both when used alone and as the hull of an outrigger canoe is peculiar; it is absolutely distinct from all Indian peninsular types, approximating closely to the Australian type; instead of the sharp ends invariably favoured among the former, those of Andaman canoes are rounded, and the bow is prolonged horizontally forwards to form a overhanging shelf or platform to give footing for the harpooner on the look-out for turtle and great fish; at the stern a corresponding but much reduced projection is present. This form is distinctly primitive, characteristic of people still in the crude hunter-stage when reliance is placed solely or mainly upon barbed lances and harpoons and not upon nets for the capture of food from the sea.

The outrigger frame is invariably single; the float is connected with the hull by multiple booms varying in number according to the size of the dugout—never less than three nor more than twelve as an extreme maximum. The booms are slender poles secured at their inner ends by being passed through holes in the sides of the dugout close to the edge—a most peculiar method seen nowhere else in India but found either exactly similar or in some variant form in the outriggers, both single and double, of North Queensland, Australia.

The connection effected between the float and each boom is indirect, by means of three short stanchions; these are inserted in line longitudinally upon the upper surface of the float. The middle stanchion is vertical, its upper end lashed to one side of the extremity of the boom; the outer ones converge, their upper ends passing *beneath* the end of the boom, lashed thereto with rattan on each side of their vertical companion. The upper ends project irregularly beyond the upper surface of the boom. This method of connection again shows close relationship with that characteristic of certain Australian outriggers, differing however in the number of stanchions employed. In the Queensland form from Cape Bedford and neighbourhood, two only are used, the median or vertical one being omitted.¹ In this type a wholly unusual modification of the boom fitting is found, two twin slender rods being used therefor, the outer end of one being inserted over, and that of the other under, the crossing of the two stanchions. No vestige or suggestion of this modification is seen in the Andamans, but with the exception of this and the addition of a vertical (third) stanchion, the Andaman outriggers show such close resemblance in all details to the typical Queensland form, that it is obvious they have had a common origin. In both, (a) the canoe form is the same, both have the same lack of sheer, the same rounded ends and bow platform; (b) they agree in having multiple booms of no fixed number—the Andamanese cannot count beyond three—and (c) in the booms passing through the sides of the canoe; (d) the float connection though differing in one detail, is essentially of the same type. Only in the use of twin slender boom poles by the Australian type in place of a single stout boom is there any marked difference between the two. Were the points of similarity confined to one or even two important structures, one might consider them as coincidences or as a case of convergence brought about by like needs, like habits and similar environment; when the coincident structures comprise all those of importance, the evidence becomes cumulative and we cannot accept the view of independent origin—both canoes must have had a common ancestry.

It is difficult to avoid the conclusion that to the Negritoës, low in civilization though they be, the invention of one form of the outrigger canoe is to be traced, and that the nearest approach to the original design is that existing still in the Andamans. From the Negritoës the Australians appear to have borrowed this design, without ability to improve upon it. As this primitive form is of the single outrigger type, we may conclude that the single antedated the double outrigger: the evidence of Polynesia tends to the same conclusion.²

NICOBAR ISLANDS.

Although situated at no great distance, scarcely ninety miles from the Andamans, and although the single outrigger canoe is again the characteristic boat form,

¹ Haddon, A. C. "The outrigger Canoes of Torres Straits and North Queensland" in *Essays and Studies presented to W. Ridgeway*, Cambridge, 1913.

² I am indebted to the Chief Commissioner of the Andamans for kindly supplying the details of Andaman canoes given above; these may therefore be taken as accurate. A good figure of an Andaman outrigger with four booms is given

the Nicobar Islands design is radically different from that of the sister group. The outriggers found here are better built and more elegant in form and never possess more than two booms. Instead of the crudely fashioned hull without sheer prevalent in the Andamans, we find the Nicobarese bestowing considerable care and taste upon the lines and decoration of their canoes; the bow is carried high in a graceful curve to terminate in an extremely long-drawn-out prow ornament adorned with a stiff flag at the apex, while the stern is produced considerably in an acuminate projection inclined slightly upwards. "The hull is charred and decorated by grooved bands running at short intervals from gunwale to gunwale round the outside. These canoes are fitted according to size, with from one to four short bamboo masts, each supported by four widespread stays of rattan, and on these are hoisted lateen sails with a short tack of about 12 inches, made of cotton or pandanus leaves. The masts are never stepped on the floor of the canoe, but always on one of the crossbars or thwarts."¹

In the case of the largest three-masted canoes, the fore mast is placed in the bows, and well forward of the fore outrigger boom; the main and mizzen masts are stepped between the two booms, the mizzen just forward of the aft boom. All the masts are vertical and short, the main being a little longer than the others. The yards are longer than the masts.

The chief peculiarity of these canoes is in the form of the outrigger. The booms are invariably two in number lashed above the gunwales at their inner ends, each being connected with the long float by means of three pairs of divergent stanchions crossing beneath the boom. The fore pair of stanchions slope outwards and backwards; the mid pair away from one another, while the aft pair pass outwards and forwards. The upper extremities of the stanchions project conspicuously above the boom, the length being often nearly equal to that between the boom and the float. The stanchions are rod-shaped, the lower ends pointed and inserted in holes in the float without lashing. The upper ends are lashed with rattan to the boom.

The differences between the Nicobar and Andaman outrigger designs are so great and fundamental that it is impossible for one to be derived from the other. Discussion of this question and of the respective origins of both must however be postponed to a later page.

RIVER CRAFT.

In the general types of river craft seen in India, much less ingenuity is shown in evolving designs for local needs, and correspondingly clearer and more primitive are their relationships to types known in the ancient world. The simplest and quaintest are the plantain-stem catamaran of Tanjore and Bengal, the chatty-raft of South India, the round coracle of the Cauveri and Tungabhadra and the double palm dug-out of the Godavari.

by Monat in his *Adventures and Researches among the Andaman Islanders*, 1863, while a model, agreeing in all essential particulars but furnished with eight booms, finds a place in the Ethnological collection of the Indian Museum, Calcutta.

¹ Kloss, C. B., *In the Andamans and Nicobars*, London, 1903, page 79. In this work an excellent illustration of a Nicobar outrigger canoe is given.

The first of these is probably the most primitive form of river craft evolved by prehistoric man. In the form seen alike in Tanjore and in Bengal where plantain (banana) stems are valueless as soon as the fruiting age is passed, it consists of 5 or 6 of these stems roughly trimmed at the ends and fastened together raftwise by a skewer of wood or thin stake passed through the series from side to side at each end. Banana leaf-stalks, whereof these "stems" are really made up, are full of tiny cubical air spaces and these give quite a considerable flotation value to the structure. It is the expedient of the moment—the simplest form of raft that will serve an emergency—a thing to be cast aside almost as soon as used.

The chatty-raft, while equally primitive, is still more ingenious. As seen at Vellore, it consists of two ordinary earthenware pots (chatties) turned upside down and connected tandem fashion by means of a stick lashed on each side of their necks. A space of some two feet is left between the pots and on this fragile frame a man can sit astride when the strange contrivance is "launched" into the water. At Vellore Fort this raft is used in order to reach the water-lilies which abound in the deeper parts of the moat; the leaves are collected to serve as platters.

The coracle such as we see to-day in use on the Cauveri and the Tungabhadra, on the Tigris and Euphrates, marked a great advance in our ancestors' efforts to harness the waters to their service. In this design the framework of the craft is of wickerwork made watertight by several devices. The Indian coracle probably preserves to us the original type; it consists of a very large wide-mouthed circular basket of much flattened form; it may indeed be termed flat-bottomed; the sides are comparatively low (Pl. V, fig. 6). A common size is fully 12 feet in greatest diameter which coincides with the mouth, the bottom being of smaller diameter. Over the outside is stretched and fitted a hide covering which efficiently excludes the water. In Tanjore and along the course of the Cauveri it used to be extensively employed in ferrying passengers across rivers but to-day it is going steadily out of use before the advance of the bridge-maker. This Indian coracle differs considerably in form from the Arab *guffa*, greatly in evidence for the same purpose on the Tigris and Euphrates, the latter having convexly curved sides with the diameter of the mouth less than that of the equator. A further distinction is that in the Mesopotamian design a hide covering is discarded in favour of pitch, but the former method is the older, for Herodotus tells us that hide-covered coracles were used by Assyrian wine-merchants to convey the produce of their vineyards down the Tigris to the cities of Chaldea. He tells us too that each merchant took with him one or even two asses in the coracle so that after selling the cargo, he might dismantle the framework, sell it for what it would fetch and then load the hide on one of the asses, returning home by land. The coracle has indeed a notable lineage and in its distribution ranges as far west as Ireland, where to-day on the Donegal and Clare coasts, elongated boat-shaped coracles are extensively used in the sea-fisheries. This altered shape permits of oars being used. These Irish coracles are covered with tarred canvas.

Lastly we have the double palm-butⁿt dug-out in use on the Godavari river (fig. 21). The main features of these have already been described in pointing to them

as most probably the prototype of the strange shoe-dhoni of Cocanada and the Godavari delta. The name they go by is *sangādam* and it is noteworthy that this term is used also in Ceylon and in the Tamil country of the south for any kind of double canoe.

Of river craft other than the primitive relics of prehistoric boat-building, the Ganges from Benares to the sea provides the best Indian example of a busy inland waterway. Except on the crowded rivers of China, a busier scene than that in the lower reaches is nowhere to be met with anywhere in the world—two endless processions of craft of all sizes, but in the main of one general type, passing continuously up and down on the bosom of the silt-laden mother of rivers.

A distinctly old-world feeling pervades the scene; the majority of the boats have the high stern and low bow of the craft that crowded the Nile in those far-off days before Arab influence had appeared to change out of all semblance the stereotyped

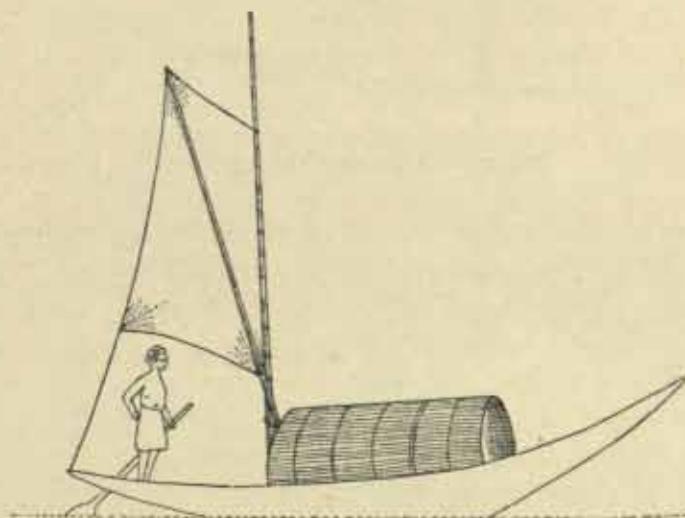


FIG. 24.—A Ganges dinghi.

designs affected by the worshippers of Amen and Osiris. The chief exception is the ubiquitous one-man passenger dinghi of sampan habit that loiters about hawkeyed on the look-out for possible fares (fig. 24). In these little skiffs, the mosquito craft of the river, the boatman squats aft paddling on the low sharp stern. The bow rises sharply to end in a narrow-pointed stem about 2 to 2½ feet higher than the level of the stern. A neat cabin with semicircular roof occupies the space available amidships. With a fair wind and some considerable distance to go, a tall bamboo mast is stepped abaft the cabin and a thin cotton sprit-sail hoisted high enough to enable the boatman to see ahead as he stands at the stern steering with a long paddle.

All the larger boats, whether small fishing boats or large rice carriers, with the frequent need to row against the current are characteristically low forward. The stern is particularly high with a view to give the steersman a clear outlook. Usually bow and stern are sharp, the latter greatly raked. These boats may indeed be said to be

identical in all their essential features with the lesser craft depicted on the walls of ancient Egyptian tombs or preserved to us in models made for the use of the dead.

The fishing boats, often passenger or cargo dinghis converted for the nonce, may

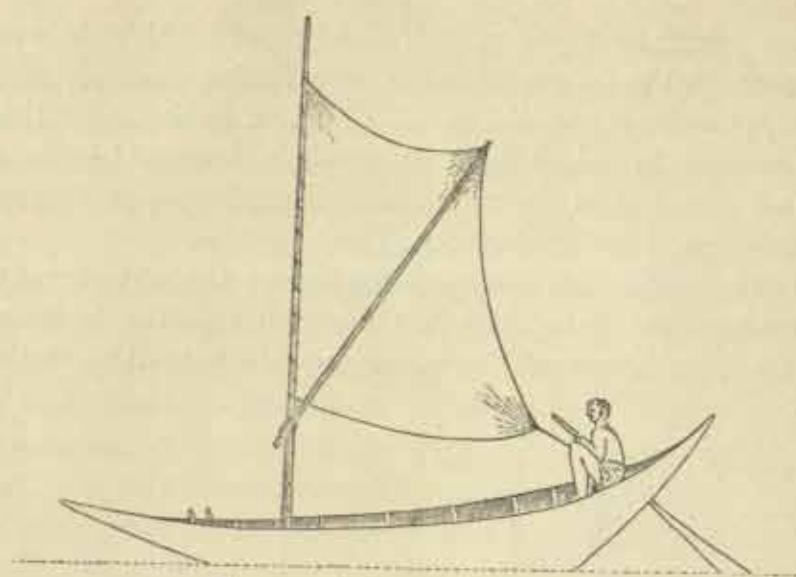


FIG. 25.—A Ganges Fishing Boat.

or may not have a cabin amidships, but all carry a high spritsail set well forward towards the bow and not aft as in the little sampan dinghis (fig. 25). This form, manned by 3 or 4 men, is greatly in evidence during the hilsa season when a long procession

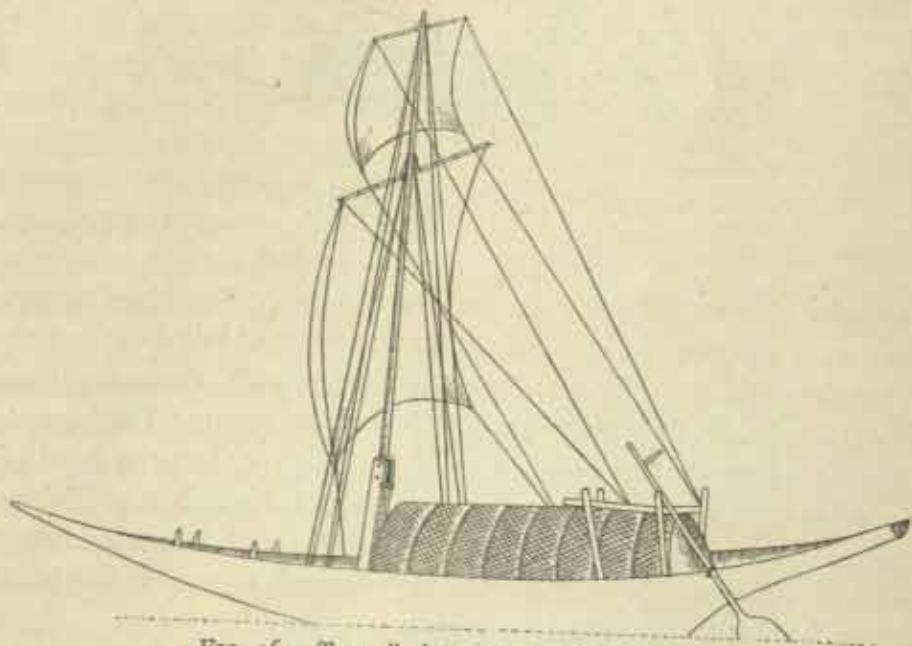


FIG. 26.—Topsail river boat of the Ganges.

of these boats is often to be seen drifting rapidly down stream with nets submerged, with another series sailing or rowing upstream with decks encumbered with the huge bamboo crescent trap-mouths of their sangla net.

Above this size of boat, the spritsail rig is seldom used; a big squaresail takes its place with a topsail above in many cases (fig. 26). The mast is always stepped far forward. Right in the bows a number of wooden thole-pins are set in the gunwale ready for use with the powerful sweeps usually lying alongside ready for a loss of wind or tide.

The most remarkable feature of these cargo carriers is the great steering paddle. Supported in a grommet from the quarter gunwale, the shaft is specially long as the steersman works it from a high platform on the aft roof of the cabin. To give easy leverage a short handle bar—the prototype of the tiller—is fixed at right angles into the paddle shaft near the free end.

The blade itself is very wide and powerful, but rather short. This form of steer-

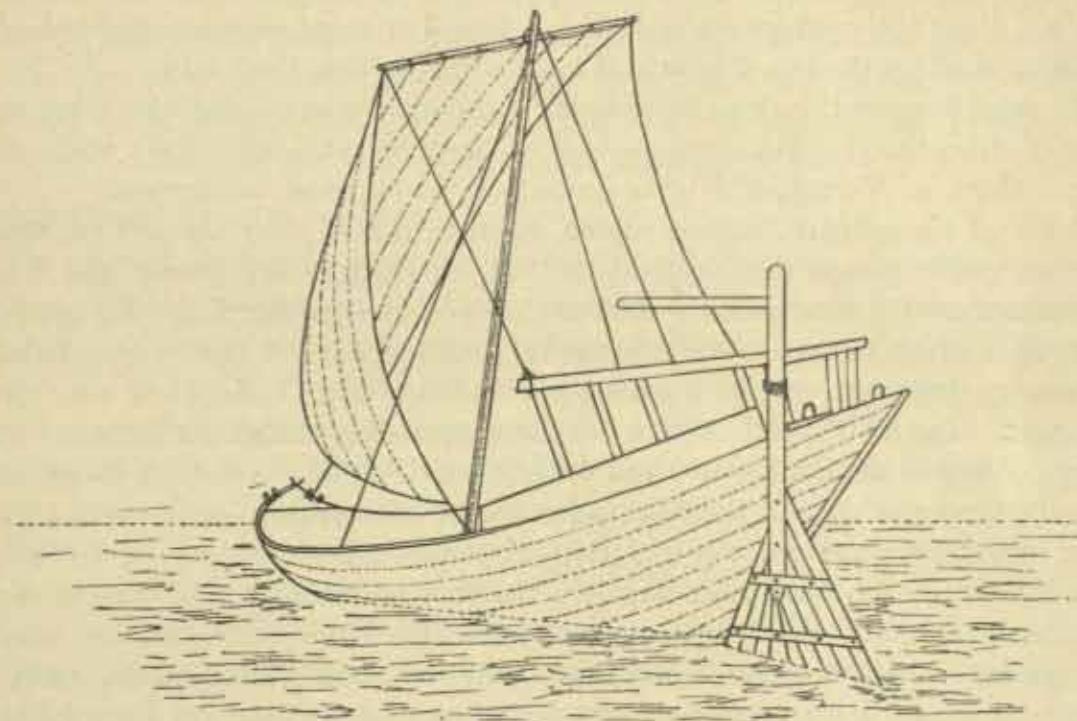


FIG. 27.—A cargo-carrier of the Ganges.

ing paddle is essentially the same as the type of fixed quarter oar characteristic of ancient Egyptian craft. It is notable that in Egypt this device was employed even in quite small boats whereas in Bengal it is never used except in the cargo carriers. In the largest river cargo carriers a very wide and powerful rudder takes the place of the steering paddle (Pl. I, fig. 2); in many cases it assumes the form of a balanced rudder in which a considerable portion of the blade is placed forward of the turning axis exactly as in the fixed quarter steering paddle from which it is plain to see it is directly derived. Between the steering paddle and the balance rudder fitted upon a sternpost, an intermediate form (fig. 27) is sometimes seen; in this the balanced rudder form in nearly all its details is used, but differs therefrom in being hung from the quarter and not upon the sternpost.

In Burma an entirely different type of river craft is in use, bigger, smarter, and better built by far than the rough and archaic Bengal rice carriers. To quote the description given by Warington Smythe in his charming "Mast and Sail":—

"Owing to the prevalence of the southerly sea breeze which blows upstream for many months after the end of the cool season, these boats are rigged only for running up against the stream. When going against the wind they punt or pull along with the current, and never beat to windward. The squaresail, or square-headed lug, is the only sail practically known in Burma. And in these boats the mast is a triangle formed of two spars meeting at the apex in a manner already familiar to us in ancient Egyptian drawings of the third and fourth dynasties, and still also used in the Red River of Indo-China.¹ The yard is a standing spar supported by a network of halyards. The sail and its topsails are brailed up to the mast, and when set are hauled out along the yard from the deck. A crowd of these craft running before the fresh south wind up the broad Irawaddi form a fine sight in their way."

The most beautiful work in these boats is about the stern and the steersman's seat upon which the Burman loves to bestow his most elaborate and careful wood carving. Here, as Warington Smythe remarks, "the classical scholar may recognize his old friend the ancient *κυβερνήτης* sitting in state raised aloft beneath his *άφλαστον*; and he may study almost the identical method in which Greek heroes and Roman merchantmen used to sling their oar-blade rudders on the quarter, following the Egyptian example which takes one back to the very earliest days of man's boat-building.

Some up-river forms of boats among the Burmans and Talaings are very pretty and elegant. The fiddle-head 'clipper' or 'schooner' bow shape is a great favourite, although, owing to the shallowness and rounded-up form of the ends of these canoe-built craft, the lower edge of the stem is frequently carried right out of water."

For minor river and creek work, dug-out canoes are everywhere in evidence in Burma, the design light and more elegant than that of Malabar. In Burma proper the clipper bow and overhanging stern common to the large river craft are adopted, giving an exceedingly graceful appearance. In the Shan States on the great Inle Lake, the fishermen use a narrow shallow design very lightly hollowed along its length except at either end where it is left flat to form a tiny platform. Both ends are broad and truncated, terminating in two short claw-like horns. It is virtually a hollowed-out plank rather than a dug-out tree trunk; its draft is exceedingly small and its form such that it can be poled with ease over weed-grown shallows where no deep dug-out could pass.

¹ It was also the common mast form in Java in the 8th century as shown in the Boro Budur sculptures in that island.—J. H.

PART II.—A REVIEW OF OUR KNOWLEDGE OF ANCIENT SEA-TRADE WITH INDIA.

Before discussing the ethnological bearing of the facts enumerated in Part I, and seeing what light they shed on the question of trade intercourse between India and the surrounding nations and races prior to the modern historical Indian sea-era which dates from the arrival of the Portuguese in 1498 A.D., we require to review our knowledge of the subject as obtained from sculptures, drawings, and inscriptions in respect of the most ancient nations, and from historical writers and geographers in classical and mediaeval days. Taken more or less in order of their age, we may list the countries or races that have had or may have had trade intercourse with India as follows :—Egyptian, Babylonian and Assyrian, Phoenician and Jewish, Greek, Sabæan and Arab, Chinese, and finally Malay and Polynesian.

THE EGYPTIANS.

The ancient Egyptians have not commonly been accounted a sea-faring race but we have ample evidence, in the frequent representations of boats and galleys of sizes from a one-man punt to large sea-going cargo galleys, and from the important part played by boats in funeral ceremonies, that they were no mean boat-builders and sailors, though it is not unlikely that the pilots and crews employed on ships engaged in oversea trade were often recruited from coast people not necessarily Egyptian by race. Even as far back as the pre-dynastic period which probably lasted till after 4000 B.C., we see crude representation of boats painted on pottery and in rude incised pictures on the rocks. Besides the light boats in which they attacked the hippopotamus and the crocodile with harpoons and lances, they built vessels of considerable size on the Nile, apparently propelled by many oars; sailing ships were rare but were not unknown.

In the old kingdom which lasted from 2980 to 2475 B.C.,¹ in every town and on every large estate ship-building was constant. There were many different styles of craft from the heavy cargo boat for grain and cattle to the magnificent galley of the noble, rigged with a great square sail.

It is important to note that while in the oldest Egyptian boats as depicted on prehistoric pottery their one mast was a single spar, representations of those belonging to the dynasties from the 4th to the 11th frequently show the mast as double, formed of two spars stepped apart but so inclined in A-form as to meet at the mast-head. From the 11th dynasty the single-spar mast alone survives.

Sneferu of the 4th dynasty, who ruled *circa* 2900 B.C., built vessels nearly 170 feet long for traffic and administration on the Nile. He opened up commerce with the

¹ All these ancient Egyptian dates are still problematical. Some authorities would put the earlier of these dates over 2000 years further back. I employ the chronology adopted by J. H. Breasted in *A History of the Ancient Egyptians*, London, 1908.

north, and the journey of the 40 vessels which he sent to the Phoenician coast for cedar out of Lebanon is the earliest known mercantile expedition on the open sea. The first war-fleet soon followed, for a relief belonging to the time of Sankh-ka-Ra (*c.* 2743-2731 B.C.), discovered at Abusir, shows four of his ships with Phoenician captives among the Egyptian sailors. This is the earliest surviving representation of sea-going warships. More directly interesting to us are the references to the sea trade between Egypt and a certain mysterious land of Punt never yet determined positively, that now begin to appear. The enterprising Sankh-ka-Ra (or Sahure) after his success in the Mediterranean, next despatched another fleet to Punt. Some 1,250 years later the autocratic Queen Hatshepsut is recorded as having sent a fleet of five ships to the same land (*c.* 1500 B.C.), and it is certain that numerous others, whereof the records are lost, had gone from time to time to the same destination in quest of the aromatic gums required by the Egyptians in large quantities for embalming. The precise location of Punt has been a fertile source of dispute among Egyptologists, and at first I felt inclined to put in a claim for South India. Punt might well be an Egyptian rendering of Pandya, the dynastic name of the kings of the extreme south from the earliest historic times. The idea is attractive in view of the subject of the present enquiry and of the fact that the Egyptians described the people of Punt as resembling themselves, which neither the Arabs nor the Abyssinians do, whereas many Indian people, particularly on the West Coast, do sufficiently closely approximate to merit such a remark.

But the products brought back, gold, ivory, ebony, myrrh, dog-headed apes, leopard skins and incense trees, while in the main Indian as well as African, in the inclusion of dog-headed apes and incense trees, both distinctive of Somaliland and South Arabia, and in the omission of spices, pearls, diamonds, teakwood and peacocks, some of which would certainly have been found in return cargoes from India, force one reluctantly to the conclusion that South Arabia or the neighbouring African coast was the utmost limit of this ancient sea-traffic. But if early Egyptian sea-trade did not extend to India down to 1000 B.C., a power which had for centuries been gradually learning sea-craft in the hard school of the rough waters of the Eastern Mediterranean in subordinate competition with the Minoans (who seem to have been the earliest sea-power of consequence in the Mediterranean), on the fall of the latter, expanded with sudden vigour and became at once their greater and more brilliant successors. Thus, good as the Egyptian sea-galleys were, those of the Phoenicians were better and as early as the time of the great Thothmes III (1501-1447 B.C.), nephew of the lady who sent her fleet to Punt, Phoenician galleys such as the Nile had never before seen, delighted the eyes of curious crowds at the docks of Thebes.

THE JEWS, PHOENICIANS AND PERSIANS.

Whether the Phoenicians traded by any sea-route with India prior to the tenth century B.C. is extremely doubtful; it is most probable that what Indian produce reached Babylon for sale or barter to Phoenician merchants went in the main overland through Persia so far as the smaller and more precious articles were concerned,

while the less valuable and more bulky were carried in small Indian or Arab coast craft from Malabar and Gujarat to Babylon itself which then was nearer the sea than at the present day.

The insatiable needs of that magnificent potentate King Solomon (*circa* 950 B.C.) appear to have been the cause of the first great attempt to open up direct sea-trade with India. For this purpose he found it necessary to enter into a working partnership with the greatest sea-king of the time, Hiram of Tyre, who aided him with timber from Lebanon, with shipwrights to build vessels, and with sailors and pilots to take them eastward to Ophir which cannot well have been other than a great mart on the West Coast of India,¹ where the produce of the gold mines of Hyderabad,¹ of the spice lands of Malabar, and of the gem-workings of Ceylon, were concentrated to meet the foreign merchant-king's requirements, just as, at a later age, this rôle was occupied first by Broach and later by Surat.

To plan a lengthy trading voyage from the head of the Red Sea and across the Indian Ocean without preliminary exploration is unthinkable; Egyptian sailors many centuries before had found their way to Punt, and where they went, the Phoenicians would find it easy to follow. Saba, the Biblical Sheba, occupying the south-west corner of Arabia and comprising Aden and Musa among her ports, was probably the usual mart where Egyptian and Phoenician products were exchanged for the spices, gold and precious stones of India and Ceylon. If so, it is a fair inference that Solomon's "wisdom" in equipping a fleet for direct trade with India, had the elimination of very greedy middlemen in the persons of Sabaean traders as its mainspring of action. Here I may mention that the term Sabaean as equivalent to Arab lasted at least till 400 A.D., as Fa-hien who travelled in India and Ceylon A.D. 399-414 in describing Anuradhapura in Ceylon (Beale's translation), says: "In the city there are many Vaisya elders and Sabaean merchants whose houses are stately and beautiful." Legge, a competent authority upon Chinese, remarks (as quoted in the *Ceylon Literary Register*, Vol. II, p. 216), "Sabaean as Mr. Beale's rendering of them (the Chinese characters) is probably correct. I suppose the merchants were Arabs, forerunners of the so-called Moormen, who still form so important a part of the mercantile community of Ceylon."

The prophet Ezekiel in his "Dirge of Tyre"² enumerated among the merchants who traded in her markets, those of "Sheba with spices, precious stones and gold." Of these, spices are not typical products of Arabia, and if Saba bartered them with Tyre, it was as a trade intermediary between Tyre and India.

¹ Possibly Ophir was not the name of any particular city; it may have been the name of some district on the West Coast of India. It is noteworthy that in the Septuagint it appears as οὐράνης, and that Οφίρ is the Coptic name for India (McCordle's Translation of the "Periplus," p. 127). Supara near Bassein, mentioned as Souppara in the "Periplus" as an important town and rival of Broach, would also answer fairly well as an outlet for the gold of Hyderabad, but H. G. Rawlinson (*India and the Western World*, p. 12) on the other hand considers Ophir to have been an Arabian trading port at the mouth of the Persian Gulf on the coast of Oman. This I doubt greatly. The Phoenicians were too expert seamen to require three years for a round voyage to Oman and back, whereas to a port on the Indian coast, this period would be reasonable under the conditions then prevailing.

² Ezekiel xxvii. 22.

It does not seem that the direct sea-trade initiated by Solomon and Hiram between the Red Sea port of Ezion Geber (the modern Akaba) and India became permanent. Doubtless Sabaean power, seated astride the highway to India at the Straits of Bab-el-mandeb, was able to check any but a powerfully armed fleet, while their alliances with Indian coast rulers were doubtless strong and, as happened when the Portuguese arrived, they would oppose by force as well as guile the entry of any new sea-power. Hence I cannot believe that Phoenician sea-trade penetrated to India directly except on such exceptional occasions as Solomon's Ophir expeditions. We have no knowledge of any Phoenician trading settlement towards India except the probability of one upon Bahrein Island, which must have been maintained by the Phoenicians principally as a pearl-purchasing station.¹ It would also form a convenient centre for their purchase of Indian wares from Indian merchants resorting thereto on the same errand as themselves. That no Phoenician settlements save Bahrein were made on Asiatic coasts east of the Levant, whereas they had innumerable colonies and settlements throughout the Mediterranean, must clearly have been due to the impossibility of adequately supporting and reinforcing stations to which the only access was by caravan through Babylonian or Egyptian territory. Hence their undoubted preference for a concentration of effort in the Mediterranean where their sea-power permitted direct communication by sea between the mother city and her daughter colonies. It is obvious that Indian trade would be more safely carried on in co-operation with the Sabaeans and other peoples of the Arabian littoral. Phoenician traders probably did make their way east from the Red Sea and the Persian Gulf, but for the most part it would be as individual traders on Arab or Indian ships and not in great companies in fleets of their own. The difficulty of finding timber fit for constructing large boats would be not the least of their difficulties seeing that neither the Egyptian coast nor that of the Persian Gulf provides any really suitable timber nearer than Syria and the Kurdish mountains respectively. When Sennacherib in 705 B.C. wished for the assistance of a fleet for his attack on the sea-coast of Elam, he had to send for Phoenician ship-builders and the timber used had to be brought laboriously from Lebanon by caravan. Only the inferior native craft transformed on the Tigris into galleys for the occasion were made of Kurdish wood and that also was not easily procured.² It is very probable however that the coast people used imported Gujarat and Malabar teak, for in the Achaemenid city of Susa built by Darius within 200 years of Sennacherib's time we find fragments of this wood; such a bulky article was certainly not brought overland through the passes of Afghanistan. In the ruins of the same city carved articles, libation vessels and bangles, made from the Indian conch are abundant,³ and as these are found plentiful at the present day on the coast of

¹ Strabo (*Geography*, XVI, 3, 3-5) describes the shores as dotted with Phoenician temples, whilst of recent years excavations of some of the myriad tumuli on this island, have yielded remains which are believed to be Phoenician (*Report, Indian Archæol. Survey*, 1912-13).

² Maspero, G. *Ancient Egypt and Assyria*. London, 1892, p. 340.

³ Hornell, J. "The Indian Conch" in *Mar. Zool. of Okhamandal*, Pt. II, p. 2, London, 1916. These articles are in the Louvre Museum, Paris.

Kathiawar, the province traditionally associated with early Indian sea-trade, we may be reasonably sure that in 500 B.C. ships built of Indian teak and manned by Arab and Indian sailors were carrying on a brisk trade between India and the Persian coast and equally certainly with Aden and the ports of the Sabaeans.

Historical evidence indicates that the external sea-trade of India received great stimulus at this period from the far-sighted commercial policy of Darius. This, like that of Alexander, two hundred years later, had for one of its objects the exploration of the seas between India and the West. The great king employed a Greek mercenary, Skylax of Karyanda, to test the possibility of establishing communication by sea between the Indus and Egypt. Herodotus states definitely that after the completion of this voyage which took thirty months, and the conquest of the Indus Valley, Darius "made use of the sea in those parts."¹ The completion by Darius of the Suez Canal, begun by the Pharaoh Necho,² was doubtless part of an ambitious scheme designed to link up the Mediterranean with the Indian and Persian coasts and to utilize sea-power in maintaining the authority of the central power over outlying seaboard regions difficult to reach by any land route.

THE GREEKS AND ARABS.

With the destruction of Tyre by Alexander the Great in 332 B.C. and the pioneer voyage from the Indus to the head of the Persian Gulf of a Greek fleet of galleys built on the river Hydaspes,³ the Greeks, already an enterprising seafaring people, took the place occupied so long by the Phoenicians in sea-trade, and having by Alexander's triumphant campaigns obtained what their predecessors had lacked—territorial bases on the Red Sea and the Persian Gulf—at once were able to develop trade with India upon a scale never before attempted. Now began the era of the Greek geographers who sometimes from personal travel and oftener from the lips of Greek and Arab and Indian traders, put together the first pilot's itinerary of the Indian Ocean and constructed the first rough maps of the Asiatic coasts of which we have any knowledge. Among the foremost events of Greek dominance in Asiatic waters was the opening of the port of Berenice, due east from Assouan, by Ptolemy Philadelphus

¹ Herodotus, IV, 44.

² *Ibid.*, II, 158.

³ Nearchos, the admiral of this fleet, has left an extremely valuable account of the voyage. He enumerates the names of the commanders of 33 galleys—all Greeks with the exception of one Persian—and although several of these appear to have been replaced by others before the Indus was left, we may infer that Nearchos' expedition approximated to this number. The total of Alexander's fleet that left the Hydaspes is given as 1,800, which "included the long narrow war galleys, the round-shaped merchantmen and the transports for carrying horses and provisions to feed the army." The bulk of these were Indian-built river boats collected locally, but as we know that some new vessels were built specially, we may be certain that the sea-going war-galleys were of this number, as river boats would not be suitable for the long voyage projected up the Persian Gulf. Just as Solomon and Sennacherib had to invoke the help of the Phoenicians, so here again their skill as designers and as shipwrights was doubtless invaluable to Alexander; we are not told so specifically, but as Nearchos states that Alexander provided crews for the vessels by selecting from those Phoenicians, Cypriotes, Egyptians and islanders in his army, all "those who were skilled in seamanship to manage the vessels and work the oars," we may be sure he fully utilized the shipbuilding skill of these races to the utmost. We must infer therefore that the sea-fleet consisted solely of war vessels designed after the accepted Phoenician and Greek types of the day; they were not of local or Indian design.

in 285 B.C., and the establishment of direct trade with India. The merchandise landed at Berenice was carried on camelback 258 miles through the desert to Koptos, whence it was transported south by barges to Alexandria. An alternative and in some respects more convenient port further north at Myos Hormos was subsequently opened by the same monarch in B.C. 274, but even this involved a desert march of over 100 miles to Koptos. This was the beginning of the golden age of ancient sea-trade between Egypt and India, which received increased impetus when the Romans seized Egypt on the death of Cleopatra. For some three hundred years thereafter, this trade must have been relatively enormous to anything that had preceded it.

Pliny tells us that the trade with Rome was chiefly in spices, condiments, scents and unguents beloved of the gourmet and voluptuary. Pepper curiously enough was in exceptionally great demand and reached incredibly high prices, sometimes rising nearly to ten shillings a pound. From Pliny's figures the drain of money to India became even an economic danger as India took little merchandise in exchange. As much cash and bullion (100,000,000 sesterces) as are equivalent to a sum variously estimated at from £800,000 to £1,000,000 of our money are said to have been annually paid by Rome for Indian produce in the heyday of the Empire.¹

To give some particulars, Strabo tells us that in his time (B.C. 63–A.D. 23) the trade between India and Egypt *via* the Red Sea had increased enormously since the Ptolemies, when "scarcely any one would venture on this voyage and the commerce with the Indies." In his time great fleets of as many as 120 vessels were engaged in the trade, sailing from Myos Hormos.²

From Pliny the Elder (A.D. 23–79) we learn that the fleet for India chiefly used the port of Berenice, leaving Egypt in the middle of summer and returning in December or January, from which we see that the monsoon winds were known and taken advantage of, for if the vessels arrived off Aden in August the worst of the south-west monsoon would be over and the current setting eastwards along the Arabian and Mekran coasts would bring the fleet to Broach and Malabar just at the time when in present days the Arab fleet from Busra drops anchor in Bombay and Calicut harbours. Returning towards the end of the year they would have equally favourable weather, just missing the unfavourable strong north-west wind that prevails in January.

Ptolemy of Alexandria who flourished towards the end of the second century gives a formidable list of Indian ports, bespeaking prosperous economical conditions, but it is the "Periplus of the Erythraean Sea," written as far as can be learned by an Egyptian Greek soon after the beginning of the second half of the first century, that pictures most vividly the sea-trade of that time. Maritime knowledge and skill had markedly advanced since Strabo's days; navigation had become systematised and new routes discovered. Thus instead of hugging the coast round the head of the Arabian Sea, the fleets from Berenice and Myos Hormos after making Müza,³ an established and notable mart of trade,⁴ situated some 25 miles north⁵ from the

¹ Pliny's *Natural History*, XII, 18.

² Strabo, *Geography*, II, 5, 12.

³ Not "25 miles south of Mocha," as given by R. Mukerji, *Indian Shipping*, London, 1912.

present-day port of Mocha, proceeded first to Eudaimon Arabia, the modern Aden, and thence to another great port on the South Arabian coast called Kanē, which has been identified with the port now called Hisn Ghorāb. From there the section for Broach sailed to the Indus and thence coastwise to their destination, the most suitable course for sailing vessels; the fleet for Malabar struck straight across the Indian Ocean direct for their objective. A third route for the Malabar fleet was from Cape Guardafui. The monsoon winds were well understood and all these courses were based upon a proper utilisation of their seasonal changes. From the same author we learn that in addition to the Graeco-Egyptian trade, India had direct dealings with Arabia, the east coast of Africa and the towns on the Persian Gulf—precisely the same places served by Arab and Indian sailing craft of the present day.

It is best to let the author of the "Periplus" tell of this trade in his own words,¹ as this record constitutes virtually nearly everything definite that we know of Indian and Arab ship trade at the commencement of our era.

Muza, at the south end of the Red Sea and the chief port of the wealthy and long civilized Arab kingdom of Sabaea, was "full of Arabian shipmasters and common sailors and was absorbed in the pursuit of commerce, for with ships of its own fitting out, it traded with the marts beyond the straits on the opposite or African coast and also with Broach."

Aden, then known as Eudaimon Arabia, was under the same Arab ruler as Muza—the king of the Homerites and Sabaeans—and was called Eudaimon (rich and prosperous), "because in bygone days, when the merchants of India did not proceed to Egypt and those from Egypt did not venture to cross to the marts further east but both came only as far as this city, it formed the common centre of the trade, as Alexandria receives the wares which pass to and fro between Egypt and the ports of the Mediterranean. Now, however, it lies in ruins, the Emperor having destroyed it not long before our times."

Kanē, further along the coast, the *Periplus* informs us, "carried on trade with ports beyond the ocean—Barugaza (Broach), Scythia (Sind) and Omana and the adjacent coast of Persia." We are also told that "the population of Sokotra consisted of foreigners, Arabs, Indians, and even Greeks, who resorted thither for the purposes of commerce." After mentioning Apologos, as a regular mart of commerce at the very head of the Persian Gulf (whereof the site is now between Busra and the Euphrates), and Omana, a town on the Persian coast, we learn that Broach "maintains a regular trade with both these ports, despatching thither large vessels freighted with copper, sandalwood, beams for rafters (teak), horn, and logs of sasamina and ebony. Omana exports to Arabia a particular species of vessel called *madara*, which have the planks sewn together (*Cf.* Marco Polo's description of the Ormuz trading ships). But both from Apologos and Omana are exported to Broach and to Arabia great quantities of pearls, together with purple cloth for the natives, wine, dates in quantity and gold and slaves."

¹ M'Crindle's translation.

Finally we note that the coast between Bombay and Goa was infested with pirates in Greek times; overseas merchants dreaded it greatly, as it lay so close to Muziris, one of the chief Malabar ports of that day. The *Periplus* states that this city was then at the height of its prosperity and "frequented by ships from Ariake (i.e. Indian ships from Gujarat) and Greek ships" (from Egypt).

To the above we may add an extract from Pliny¹ where it is said:—

"To those bound for India it is most convenient to depart from Okelis" (a village opposite the island of Perim). "They sail thence with the wind Hippalus in 40 days to the nearest emporium of India, Muziris (the modern Cranganore according to Yule and Caldwell),² which is not a desirable place of call on account of pirates infesting the neighbourhood, who hold a place called Nitrias (Mangalore, according to Yule), while it is not well supplied with merchandize for traffic. Besides, the station for ships is at a great distance from the shore and cargoes have both to be landed and shipped by means of little boats. Another port belonging to the nation is more convenient, Neacyndon which is called Becare. There Pandion used to reign in an inland town called Modura far distant from this emporium. The region from which they convey pepper to Becare in boats formed of single logs, is called Cottonara."³

From this time we lose definite sight and knowledge of Graeco-Egyptian trade with India, which collapsed with the decline of Rome in the fourth century and passed again largely into the hands of the Arabs to whom after this we have to look almost entirely for information on Indian external sea-trade till Marco Polo and the other Italian forerunners of the Portuguese appear on the scene.

The fact that Solomon when he wanted to create a Red Sea fleet of traders had to build the necessary vessels with the aid of artizans brought from Tyre proves that there were no suitable vessels available in 950 B.C. on the Red Sea to act as over-sea cargo carriers and is conclusive evidence that no regular and extensive direct sea-trade with India could have existed prior to this date; occasional and elaborately prepared expeditions sent forth by royal edict for special purposes, and petty trading by means of small craft creeping slowly along the coast and usually selling their cargo at some intermediate trading port to be carried further in another boat (see *Periplus*, sec. 14), appear to have been the custom in the early centuries of sea-commerce between India and the West; the importance of this commerce appears to have been early perceived by the Sabaean Arabs, and for centuries before the Greeks entered the field, these enterprising and highly civilized people had made their ports the entrepots for Indian and Egyptian commodities. The Greek historian Agatharchides, the contemporary of Ptolemy Philomentor (181-146 B.C.), described Sabaea as owing her importance and great prosperity in large degree to the monopoly enjoyed of the Indian trade. He states having seen large vessels coming from Potana (Patala)

¹ Book VI, Ch. 23 (26).

² Caldwell in his *Comparative Grammar of Dravidian Languages* (Introduction, p. 97) says that Muziris appears to be the Muyiri of Muyiri-kotta, while Neacyndon or Nelkynda seems to be the southern boundary of Kerala proper.

³ Burnell considered Cottonara to be the district round Tellicherry, Kolattia-nadu, the finest pepper-producing district in Malabar. Yule conjectures that Becare, which was the seaport of Nelkynda, lay between Kanetti and Quilon in Travancore.

on the Indus, and makes mention of the great numbers of Indian merchants who resorted to Sabaean ports to sell and barter their goods to the Sabaeans who in turn sold them to the Egyptians and the Greeks. It seems certain also that in the prosecution of this trade the Indian and Arab shipmasters made use of the monsoon winds to steer directly to and from India, knowledge which, we may be sure, was as jealously guarded as that of the Cape route to India by the Portuguese.¹

With the rise of Greek world supremacy under Alexander, Greek commerce became dominant and what the Arabs had done previously in a small and ineffective manner to exploit Indian sea-trade was taken up and developed by the Greeks to enormous dimensions, particularly in later days, in their enterprising endeavour to satisfy the needs of Roman extravagance. The luxury of Rome in the ostentatious competition of the wealthy in the squandering of money on foreign luxuries and rarities, in my belief, was the ultimate factor that finally entailed the opening of the sea-gates of India in the second century B.C., gates which the Egyptian Greeks had been endeavouring to force ever since Alexander's navigators had demonstrated the vast possibilities of direct sea communication and its immense advantages over long and hazardous land route. Alexander may justly be counted the father of sea-trade between East and West.

With the creation in Europe of an almost unlimited market for the spices of India a couple of centuries or so prior to the commencement of our era, the seafaring Arab, who had undoubtedly been concerned in a petty way with Indian trade for centuries before, became at once a factor of importance. We are not told by any Greek or Roman writers what crews manned the Greek-owned Indian argosies; can we doubt that they were Arabs in the main? Their previous knowledge of the trade would be invaluable to Greek merchant-venturers, and any other supposition is difficult in view of the fact that the author of the "Periplus" continually mentions the presence of Arab traders and ships in the course of his voyaging, as also did the Chinese traveller Fa-hien some 300 years later (between 399 and 414 A.D.).²

The Chinese trade connection now comes into view and it is noteworthy that the Arabs and Chinese held intimate commercial relations from very early times. We find from Chinese records that even in 300 A.D. enterprising Arabs from the southern Arabian coast had established a colony at Canton. The earliest Arab narratives relating to Chinese trade belong to the ninth century; from these we gather that "Chinese goods were very expensive at Basra and Bagdad because of frequent fires at Canton and because ships are frequently wrecked or taken by pirates."

From various indications it seems probable that the bulk of the direct trade between India and China between the ninth and fifteenth centuries was carried in Chinese bottoms. Marco Polo's description of the one-masted Arab vessels which carried horses and merchandize between the Persian Gulf and the West Coast of India,

¹ The charts necessary for the voyage to India were given to the Commander prior to sailing from Lisbon and had to be jealously guarded by him and given back upon his return home. (Cabotot, A., *Java, Sumatra and the other islands of the Dutch East Indies*, p 29. London, 1911.)

² Loc. cit. supra.

shows clearly that these were not well suited to the longer and more dangerous voyages to China, and the same writer has left a description of the vessels engaged in the Indo-China trade which shows them to have been typical junks. That he makes no mention of any other class of vessel engaged in this trade as he would certainly have done had there been any, seems to show that the accepted idea of the meeting of Chinese with Arab vessels at Kayal, Quilon, Calicut and Deli was the normal one, in spite of the fact that there was an Arab settlement in Canton dating from 300 A.D. The inference is that the Arab traders utilized Chinese vessels for their operations, just as Arab firms, were there any now in China, would in all probability be shipping Chinese goods to India in British-built steamers. This view receives complete confirmation from Ibn Batuta's statement that the voyage to China from Malabar is so dangerous that it can only be undertaken in large vessels which are built *only at Zaitun and Sin Kilan in China.*¹ This traveller himself when he wished to proceed to China took passage in a Chinese junk then lying off Calicut.

The Arabs prior to Muhammad's time had been content with their role of peaceful traders and sea-carriers; under the impetus of fanaticism and the lust for power and wealth which increased with each succeeding success, within four years of the Prophet's death, two Arab naval expeditions were sent from Uman and Bahrein against Thana and Broach on the Bombay coast and against Debal in Sind (A.D. 637). Other raids took place in 662 and 664, and in 712 the youthful Muhammad Kasim advanced into Sind to claim damages for a Sinhalese ship seized off the port of Debal (probably the modern Karachi). Kasim himself went overland, but the great war engines—catapults requiring 500 men to work them—were transported by sea; the size of the vessels must have been considerable for the carriage of such heavy and bulky cargo. After a brilliant campaign he settled himself in the Indus valley and thus early established a naval base of the utmost value to Arab sea-traders. This intimate relationship of Sind with Arabia has ever since been maintained with the result that Sind boat designs, as already noted, are purely Arab in every respect.

With the Bombay and Malabar coast, Arab relations were almost equally intimate but there they never obtained direct territorial power although indirectly the adhesion of certain coast potentates—notably the semi-mythical Cheruman Perumal, Lord of Malabar, and at later date the sea-kings of Cannanore—to their faith, gave them enormous influence. Their power on the coasts of Southern India had reached a high level when the Portuguese arrived, and it is more than probable that if Vasco da Gama had not brought European power to India, the Arabs would have made a bid for extensive religious domination exactly as they did successfully in Java and Sumatra at the same period. The Portuguese arrived at India at one of the great psychological moments in the history of India and destroyed the one great chance the Arabs had of founding coast kingdoms in India on the decline of the Vijayanagar power.

Originally the chief object of sea-trade with India was the desire in Europe for its spices and precious stones and fine cottons; with the growth of great states in

¹ Tsuen-chau (near Amoy) and Canton respectively, according to Yule, *The Book of Ser Marco Polo*, Vol. II, p. 190. London, 1871.

the Deccan and the south, the export of horses from the Persian Gulf became to Arab shipowners even more important. Marco Polo as usual is a mine of information on Arab trade. He tells how in one of the kingdoms of Java the Less (Sumatra) "the idolators by frequent trade with Saracen merchants are converted to the law of Muhammad"; how in the south of India the kings of Ma'abar (the Arab name for the Pandyan country on the Gulf of Mannar) buy their horses from Ormuz, Aden and other Arab ports. Still more valuable is his description of the Arab ships he saw at Ormuz:—

"Their ships are wretched affairs and many of them get lost; for they have no iron fastenings and are only stitched together with twine made from the husk of the Indian nut. They beat this husk until it becomes like horse-hair and from this they spin twine and with this stitch the planks of the ships together. It keeps well and is not corroded by the sea-water, but it will not stand well in a storm. The ships are not pitched but are rubbed with fish oil. They have one mast, *one sail*, and one rudder, and have no deck but only a cover spread over the cargo when loaded. This cover consists of hides, and on the top of these hides, they put the horses which they take to India for sale. They have no iron to make nails of, and for this reason they use only wooden trenails in their shipbuilding and then stitch the planks with the twine as I have told you. Hence 'tis a perilous business to go a voyage in one of these ships, and many of them are lost for in that Sea of India the storms are often terrible."¹

From this we gather the valuable fact that the Arab ships of the Kerman coast at the end of the thirteenth century continued to be built in the same manner as when the author of the *Periplus* saw them in the first century of our era and remarked upon the strangeness of sewing the planks of the hull together instead of using nails for the purpose. The sea-going boats of the Laccadive islands and some of the shore boats of the Malabar and Coromandel coasts continue the plank-sewn tradition to the present day, no metal bolts being employed in their construction. Marco Polo's description further indicates the probability that the mizzen mast had not yet been introduced. The dhow of the thirteenth century also appears to have had no high poop, otherwise such a prominent feature would surely have been remarked by this traveller whose descriptions are always accurate and detailed of what he himself saw. The type was apparently a small edition of the large Kathiawar Dhangi, sharp and comparatively low at the stern. The addition of the aft castle or poop with richly decorated transom stern, as seen in the Arab Baggala and the Indian Kotia of the present day, appears to have been adopted from the Portuguese caravels; the resemblance between them is most striking and convincing.

Beyond this we need not follow the course of Arab trade and ship design. It merges henceforward into the realm of every-day knowledge.

THE CHINESE AND INDIA.

Chinese trade next requires attention. We have seen how an Arab colony was founded in Canton about 300 A.D. We have Chinese travellers in India and Ceylon

¹ Yule's *Marco Polo*, Vol. I, p. 102 (1871).

at the end of the fourth century, and in the ninth century Arab narratives, as we have seen, deplore the costliness of Chinese goods in the Basra and Bagdad bazaars owing to the dangers of the sea and the attacks of pirates.

Probably the earliest notice of Chinese vessels in Indian seas belongs to the first half of the fifth century when according to Hamza of Ispahan and Ma'sudi, the ships of India and Ceylon were constantly to be seen moored as high up the Euphrates as Hira, near Kufa, a city lying some 45 miles south-west of ancient Babylon.¹

As Yule points out, after this a gradual recession took place in the position of the headquarters of Indian and Chinese trade. From Hira, it descended to Obolla, the ancient Apologos; from Obolla, it was transferred to the neighbouring city of Basra; from Basra to Siraf on the northern shore of the Gulf and from Siraf successively to Kish and Hormuz. Chinese annals of the T'ang dynasty (618-907) of the 7th and 8th centuries describe the course followed of their junks in the voyage from Kwang-chau (Canton) to the Euphrates. It also appears that Chinese ships in equally early times voyaged as far as Aden.²

By the 12th century the furthest port of exchange resorted to by Chinese vessels appears to have been Debal, the then most famous port in Sind—probably Karachi; Al Idrisi describes it as a station whither came "ships laden with the productions of U'mán and the vessels of China and India." Broach (Barfūh), he also states, was a port for the vessels coming from China as also for those from Sind.³

From this time onwards to the early part of the fifteenth century, contemporary notices of Chinese trading ships in Indian ports become frequent.

The chief Indian ports resorted to by Chinese junks during the thirteenth and fourteenth centuries appear to have been Kayal (the Cael of Marco Polo) on the Gulf of Mannar, Quilon in South Travancore, with Calicut and the fine bay south of Mount Deli in North Malabar. On the site of "the noble city" of Kayal, which had ceased to be a seaport before the arrival of the Portuguese about 1500 A.D. owing to the silting up of its harbour, I have found innumerable fragments of Chinese pottery, much of it thick and coarse and suggestive of preserved ginger—a sweet highly esteemed by Indians. Here Marco Polo landed at the end of the thirteenth century, and it is he also who mentions Delai (Mount Deli) as a place where "the ships of Mangi come." Quilon he mentions, but not as a terminal port for Chinese ships, though from other sources it is clear that this port was used as a clearing house by Arab and Chinese traders. In the long intercourse between China and India it is plain that with altering circumstances—the wane of one coast power and the rise of another, to say nothing of mercantile changes—a port occupying the premier position in one century might be supplanted in the next by another. Kayal, Quilon, Calicut,⁴ and Deli are four regarding which we have clear evidence. In passing it is notable that early

¹ Yule, *Cathay and the Way Thither*, I, p. 83. London, 1915. Some doubt seems however to attach to the possibility of Hira having ever been a haven for Eastern trade.

² Yule, loc. cit., p. 87.

³ Sir H. Elliot, *History of India*, Vol. I, pp. 77-87.

⁴ Ibn Batuta who travelled extensively in the East from 1325 to 1349, after taking his passage for China in one of thirteen Chinese junks anchored off Calicut, records how a sudden storm drove ashore several of these vessels with the loss of many lives, the remainder of the fleet heading for the open sea as the only chance of safety.

in the thirteenth century a large Chinese fleet brought to the Malabar coast several hundreds of Chinese immigrants who remained in the country for trade and commerce. Abder Razzak in the fifteenth century (1442 A.D.) speaks of the seafaring population of Calicut being called *China bhachagan* (China boys), which can only mean that the Mapilla population had then a strong Chinese strain in it. We know also from Chinese authorities, as well as from the Sinhalese chronicle Rajawaliya, that the Chinese sent a large naval force, under the eunuch Cheng Ho, against Ceylon in the beginning of the fifteenth century, a venture which resulted in the capture of the Sinhalese king Vijaya Bahu VI and his deportation to China.¹

The best contemporary description of the Chinese vessels trading to India is that of Marco Polo who sailed with a small fleet of junks from China to India and Persia at the end of the thirteenth century.

Quoting Yule's translation² Marco Polo says "and first let me speak of the ships in which merchants go to and fro amongst the Isles of India. These ships you must know, are of fir timber.³ They have but one deck though each of them contains some 50 or 60 cabins, wherein the merchants abide greatly at their ease, every man having one to himself. The ship hath but one rudder,⁴ but it hath four masts; and sometimes they have two additional masts, which they ship and unship at pleasure. Moreover the larger of their vessels have some 13 compartments or severances in the interior, made with planking strongly framed in case mayhap the ship should spring a leak."⁵

Radhakumud Mukerji falls into the grievous error of claiming these craft as Indian-built vessels.⁶ The only excuse he has is Marco Polo's occasional habit of calling them "Indian ships" according to Marsden's translation which Prof. Mukerji elects to quote in preference to the more modern one by Yule. But they were no more Indian built and Indian manned than were the "East Indiamen" of English Company days. They were built specifically for the Indian trade, hence the name. In every feature they were typical Chinese junks, a design never adopted by any Indian builders. Moreover instead of being of teak as they would have been if Indian built, Marco Polo distinctly tells us they were of fir, a fact which shortened their career most materially. Finally Ibn Batuta, whose direct evidence on this subject is ignored by Radhakumud Mukerji, states distinctly that these ships "were built only at Zaitun and Sin Kilan in China." Nicolo Conti's statement to the contrary is erroneous and on a par with his story that in Bengal bamboos grow so tall and thick that fishing boats and skiffs are made from them. If he mistook a palm for a bamboo, it is

¹ A memorial stone inscribed in Chinese, Tamil, and Persian was found at Point de Galle in Ceylon, a few years ago, and records the second visit to Ceylon of the Chinese General, Cheng Ho. It is dated 15th February, 1409.

² *The Book of Ser Marco Polo*, Vol. II, p. 195, 1871.

³ Yule points out that pine is still the staple timber for shipbuilding at Canton and in Fokien, *loc. cit.*, p. 197.

⁴ The rudder was of the usual deeply immersed Chinese junk pattern, for in Chapter IX the author states that on approaching the island of Pentan (Bintan) off the Straits of Malacca, the sea being "not more than four fathoms in depth, obliges those who navigate it, to lift the rudders of their ships."

⁵ According to Yule the system of water-tight compartments "is still maintained by the Chinese, not only in sea-going junks but in the larger river craft." (p. 197).

⁶ *Indian Shipping*, London, 1912.

not remarkable that he should mistake a Chinese junk for an Indian ship. Mukerji also ignores Varthema's description (1503-8 A.D.) of the ships built at Calicut—sambuks, kapels, etc., although he quotes the passage on p. 203.

A final quotation from Marco Polo shows how enormously valuable this trade with India was. After describing Zaitun (probably the modern Tsien-chau or Chin-chau near Amoy), the great port of arrival for ships from India, he adds:—"Hither is imported the most astonishing quantity of goods and of precious stones and pearls, and from there, they are distributed all over Manzi, and I assure you that for one shipload of pepper that goes to Alexandria or elsewhere, destined for Christendom, there come a hundred such, aye and more too, to this haven of Zaitun."¹

It would seem that the commencement of regular sea-trade between China and India cannot date back earlier than the end of the fourth century A.D.² The first direct intercourse between China and Ceylon is ascribed to the early years of the Eastern Tsin dynasty (317-420). The earlier phase of this trade appears to have been conducted in Arab, Indian, and Sinhalese ships, which gave way in great measure to the larger Chinese junks as soon as the Chinese began to appreciate the great value of Indian merchandise. This probably took place under the great T'ang dynasty for the 300 years of their rule (618-907) was a period of great expansion and progress.

How and exactly when Chinese trading fleets ceased to frequent Indian seas is something of a mystery. We know that a Chinese fleet arrived in Ceylon in 1409 and deported the royal family to China and that tribute was paid regularly by Ceylon to China throughout the reign of Parakkana Bahu Raja VI from 1410 to 1462. Nicolo Conti's description of the great trading ships seen by him in Indian seas in the earlier part of the 15th century is probably the latest surviving account of the oversea Chinese junk trade with India. Conti says, however, that they were built by Indians, obviously an error in view of his detailed description of them *in almost the same words as Marco Polo*; he describes them as having five sails and as many masts, the lower part of the hull constructed of triple planks and some provided with watertight bulkheads.³ Conti was a careless writer and I incline to think that he had Marco Polo's *Travels* before him when he wrote this. Probably, like Prof. Mukerji in recent times, he was led into this error by Polo's use of the term "Indian ships" already referred to above.

It is certain that no Chinese ships were in the Indian trade when the Portuguese arrived in India (1498); from Abd-er-Razzak's account of the trade of Calicut,⁴ and his omission to refer to the Chinese junk trade, we may further infer that even as early as this, Chinese ships had ceased to come to India. His reference to the seafaring population of Calicut under the term China boys, indicates that Chinese influence could not have been severed for any considerable length of time.

We shall not be far wrong if we put the approximate date of the cessation of the Chinese junk trade with India at about 1424 A.D., a date which coincides with the

¹ Yule, *loc. cit.*, p. 185.

² Yule, *Cathay and the Way Thither*, L. 66, London, 1915.

³ *India in the Fifteenth Century* (Hakluyt Society), Vol. II.

⁴ *India in the Fifteenth Century*, *loc. cit.*, Vol. I.

end of the reign of Ch'eng Tsue of the Ming dynasty, a ruler noted for his aggressive overseas policy.¹

To sum up the deductions obtained from an analysis of our knowledge of ancient sea-trade with India as derived from ancient sculptures and from classic and mediaeval writers, we find that :—

(a) Phoenician influence was negligible. We have no direct evidence whatever to support the view that the Phœnicians ever voyaged regularly to India or had trade settlements in India. There seems no basis for the idea of a busy Phœnician trade route to India either from a base in the Red Sea or the Persian Gulf. On the contrary the concentration of all their sea effort was directed to the westward—to go east involved enterprises strategically unsound. The weightiest fact against the supposition that the Phœnicians had vessels in eastern waters is that Solomon, Sennacherib and Alexander would have chartered such vessels for their use had there been any, instead of constructing new ones.

(b) The Egyptians certainly never went beyond the land of Punt in any of their eastward sea voyages, that is, they never passed east of Hadramaut or of Sokotra.

(c) The Babylonians and Assyrians were not a maritime people and the biggest ships they had, as shown in Sennacherib's records, were rowing galleys, usually unprovided with sails.

(d) The Greek and Graeco-Roman traffic that flourished exceedingly between Egyptian Red Sea ports, Arabia Felix and the Indian coast, roughly from 200 B.C. to 200 A.D., and lingered on another two hundred years in ever decreasing importance, was of very great extent and value, requiring the employment of annual trading fleets. We have no information as to the kind of ships engaged in this traffic, and whether they were built and manned by Greeks or built and owned by Greeks and manned by Arabs. Probably the latter was the case—it is the more probable, and this would make it clear how and why the Arabs later came to dispute with Indians the carrying trade of the Arabian Sea, as had also been the case in the days prior to Greek maritime predominance.

(e) The Sabaean Arabs of Southern Arabia appear to share with Indians the honour of having been the earliest carriers on the waters of the Arabian Sea; it seems certain that this traffic was comparatively petty and restricted prior to the opening up of the East to European enterprise by Alexander's pioneering of the Persian Gulf route. With Rome's absorption of Egypt, direct trade between India and Egypt increased enormously and was, I believe, largely in the hands of Arabs employed by Greeks. Anyway, from the fall of Rome, the Red Sea and Persian Gulf trade was run solely by Arabs and Indians with a distinct tendency to pass into the hands of the former in the period immediately preceding the arrival of the Portuguese in India. With the decline of the Portuguese, Arab and Indian sea-trade again increased considerably and in the eighteenth and nineteenth centuries it was of great importance till the advent of steam-power in Indian seas reduced its scope enormously.

¹ Yule, *Cathay*, I, 87.

(f) The Chinese entered the Indian trade at a very early date, probably not later than the fifth century A.D. The rise of their overseas connection with India seems to have synchronized with the collapse of Graeco-Roman sea-trade and somewhat antedated the rise of modern Arab sea-power. From the fifth century onwards till the fifteenth they worked in co-operation with Arab and Indian traders, meeting and exchanging wares at Kayal, Quilon, Calicut, Deli, Broach, Diu, and even Karachi (Debal) on the south and west coasts of India, also westwards to the Euphrates and for some time even to Aden. Their ships were better designed, better equipped, larger and more seaworthy than those of the Arabs and Indians. Even before the coming of the Portuguese this trade appears to have been suddenly arrested. In the earlier centuries of this intercourse, the Chinese fleet went further east than in the later period, a consequence perhaps of the inferiority of Indian and Arab ships in early days. With the growth of the maritime power of the Arabs, the Chinese trade fleet ceased to go beyond the Malabar ports.

(g) Of Malay sea-trade with India we know extremely little. There is, however, some direct and much indirect evidence that intercommunication with Sumatra and Java was considerable from very early times but this appears to have been carried on in Indian craft, until the Arabs began to be ambitious of sea-power in distant waters. This will be further treated of in the next section.

PART III.—THE PART PLAYED BY INDIAN-BUILT SHIPS IN PAST SEA TRADE.

So far we have written as though India herself had been passive in regard to sea-trade to and from her ports—a looker-on upon the brave and venturesome doings of other nations and races. This is, I believe, only partially true, and arises from the fact that her own sea-traffic was in the main coastwise within her own boundaries and that what portion was oversea traffic was far more largely directed to the east than to the west. Greek and Graeco-Roman traffic with India was restricted almost entirely to the west coast and as our only definite knowledge of ancient Indian trade is derived from Greek and Roman writers, Indian traffic with the Malay Archipelago and Peninsula failed to obtain adequate notice. There are, however, a few definite indications that there was considerable indigenous naval and mercantile activity in Indian waters at and from a very early date.

There are passages even in the Sanscrit epics, the *Rāmayana* and *Mahābhārata*, containing allusions to foreign maritime countries and to voyages thereto by sea, but these are vague and undateable, and merely tell us of the fact that several centuries B.C. sea-trade was known and carried on.

More definite are ancient Buddhist legends embodied in the Pitakas and Jātakas, particularly the latter, dating from the early centuries B.C.

Among the former the *Sutta Pitaka*, attributed by Rhys Davids¹ to the fifth century B.C., tells how long ago merchants when sailing on oversea voyages out of sight of land carried with them “shore-sighting” birds which were used in locating the nearest land when the ship’s position became doubtful. The same custom is related by Pliny (A.D. 77) as practised by the seamen of Ceylon, when making sea voyages, as they were unable to steer by the stars.²

Another passage of this Pitaka³ mentions voyages lasting for six months, made in ships which were brought ashore and laid up during the winter, a custom curiously similar to that practised to-day by the Sinhalese owners of the antique sewn-plank craft called *Yātra oruwa*. (See p. 158.)

Still more valuable is the evidence of the Jātakas which may go back as far as 400 B.C. but which enshrine folktales of much greater antiquity.⁴ The most important in this respect is the *Bāberu-Jātaka*⁵ wherein we read of Indian merchants who made periodical voyages to Babylon (Bāberu). The story as told, is dressed fantastically, but there can be little doubt that it has as its basis a tradition of a regular trade by

¹ *J.R.A.S.* April, 1899, p. 432.

² Quoted by Mukerji, *loc. cit.*, p. 73.

³ *Jātakas*, Cambridge ed., 1907, III, p. 83.

⁴ Pliny, *Natural History*, VI. 22.

⁵ Kennedy, J., *J.R.A.S.*, 1898.

sea between Western India and the Babylonian river towns, carried on by Indians and comprising peacocks as one of the articles of export from India.

That the peacock was exported from India at a very early date gains weight from the fact that the Hebrew word for peacock as used in the Old Testament, '*thuki*,' is immediately derived from the Tamil *tokei*, and that peacocks were common in Greece about 430 B.C.¹ This trade probably existed from much earlier times, for other old Jatakas make much mention of the sea-ports of Bharukaccha (Broach) and Surpara-ka (Supāra), and of long and perilous over-sea voyages made therefrom to distant lands—to Suvarnabhumi in particular, which appears to be that Further India, or Golden Chersonese, which we know as the Malay Peninsula, Sumatra and Java.

The discovery of Indian timber in the Babylonian ruins of Birs Nimroud and of Ur, in buildings dating *circa* 604-538 B.C.,² furnishes conclusive evidence of sea-trade conducted in fairly large vessels between India and the Euphrates at this early period.

This sea-trade with Babylon, carried on in Indian vessels, cannot be less ancient than the 6th century B.C. and is possibly a good deal older. Its continuance in Achaemenid times is rendered probable by the discovery of Indian articles in the ruins of Susa, these consisting of libation cups, bangles and ornaments made from the shell of the Indian conch, fished even yet in quantities on the Kathiawar coast.³ The age of these ruins brings Indian trade with this region down into the 5th century, but some of the ornaments—one bangle especially, obtained from a lower stratum—belong probably to a much older date, as Susa was a capital of the Elamites long before the Achaemenid occupation of the site. I have also identified chank ornaments from Tello (the site of the ancient Lagash) in the Louvre Museum, Paris.

Contemporaneous with this Persian Gulf trade, commercial relations with the great emporia of Muza and Aden in S.W. Arabia were certainly being carried on. Probably the earliest distinct record of this is the notice of Agatharcides of Alexandria who, about the middle of the 2nd century B.C., saw large Indian vessels arriving at a Sabæan port from Patala on the Indus. He notes how wealthy the Sabæans had become by reason of their country being the exchange centre for the Indian goods so brought by sea. This direct Indian trade is confirmed by the story told by Eudoxus who himself twice voyaged to India towards the end of the 2nd century (118-112 B.C.), of an Indian ship found derelict off the entrance to the Red Sea with one famished Indian sailor alone alive. This man, brought to Egypt by the coastguard, subsequently offered to show the route to be followed on the voyage to India and acted as pilot for the first trading expedition under the leadership of Eudoxus.⁴ Yemen at this period and for hundreds of years previously had occupied a highly favoured half-way position between India and Egypt, for it is doubtful if the direct passages of Graeco-Egyptian vessels from Egypt to India commenced or at least were common prior to the first century B.C. Indo-Sabæan trade must be exceedingly ancient and

¹ Kennedy, J., *J.R.A.S.*, 1898.

² Do, *ibid.*, 1898.

³ Hornell, J., *Marine Zoology of Okhamandal*, Pt. II, p. 2, London, 1916.

⁴ Strabo, *Geog.* II. 3. 4.

it seems probable that it is even older than that with the Persian Gulf. In A.D. 70 it was still flourishing at Muza, though it would seem from the *Periplus* that most of the ships used were Arab-owned and manned. It is of importance here to note that while this author speaks of Arab shipmasters and common sailors thronging the port of Muza, his references to Indians are as merchants only:—"In bygone times when the merchants of India did not proceed to Egypt" and "the population of Sokotra consisted chiefly of foreigners, Arabs, Indians and even Greeks who resorted thither for the purpose of commerce."

But whereas the *Periplus* does not give any support to the theory that Indian ships traded between India and the Red Sea, he records definitely that Broach carried on a regular trade with Apologos at the head of the Persian Gulf, and with Omana, apparently a port on the coast of Persia, freighting large vessels with logs of sasamina and ebony, wood for rafters (teak?), sandalwood, copper and other commodities. He adds that Omana is a shipbuilding centre, exporting completed vessels called *madarata*,¹ to Arabia, meaning Hadramaut and Yemen. A similar trade exists now—Arab vessels carrying away timber from the Malabar coast to supply the needs of the many shipyards on the Arabian coasts.

The Gujarat coast at this period appears to have been the chief centre of Indian shipping activity, for besides describing the great trade of Broach, and the systematic pilotage arrangements whereby incoming ships were met at sea by Government pilot boats large and well-manned, called *trappaga* and *kotimba*,² and led safely through the shoals which obstructed the fairway to the port, in a subsequent passage the *Periplus* refers to Muziris (Cranganore), the pepper emporium of the Malabar coast, as frequented by ships from Ariake, whereby is meant Indian ships from Gujarat. Indian pirate ships are also mentioned as infesting the West Coast at this time, rendering the voyage to Muziris dangerous.

The West Coast from Sind to Mangalore has been the haunt of piracy from the earliest days of Indian shipping. Greeks, Romans, Arabs and Italians, from the first century B.C. to the coming of the Portuguese, all give their evidence that the inhabitants of that coast made a living by their depredations upon passing merchant craft. A particularly flagrant act of piracy committed by some Sind freebooters upon a ship³ sent by the King of Ceylon to the Kalif Muwaiya (A.D. 661-679), was the direct cause of the invasion and conquest of Sind by the Arabs. Pirates presuppose trading ships and any people building and operating pirate vessels must be credited with at least sufficient skill to operate trading ships on the same coast; hence we may fairly infer, apart from other evidence leading to an identical conclusion, that from the time when Greek trading fleets appeared in Eastern waters until the present day, a great part of the coastwise traffic of India has been carried on in Indian bottoms—almost exclusively

¹ Schoff, W. H. (*The Periplus of the Erythraean Sea* (translation), London, 1912, p. 154) quotes Glazer to the effect that this is the Arabic *muddarrah*, meaning "fattened with palm fibre."

² Possibly we have in the latter word a form of the term *hotia*, now applied to ocean-going vessels showing Portuguese influence in their design, but owned largely in Kathiawar and Kutch.

³ Eight ships according to the *Chach-nama* as quoted by Sir H. M. Elliot in his "*History of India*," 1867.

prior to about the 7th century; since then more or less shared by Arab-built or owned vessels.

That these pirate ships of the Konkan, South Kanara and Kathiawar were weatherly craft we may infer from Marco Polo's description of the way in which the Konkan and Gujarat pirates scoured these seas with more than one hundred small vessels, seizing and plundering all the merchant ships that passed that way. He adds that their wives and children of all ages accompanied them aboard the ships, so we may infer that they afforded considerable accommodation. At the present day the crews of the larger fishing boats, descendants of these old pirates, continue the tradition by staying at sea, often for a week or a fortnight without coming ashore.

Neither was the maritime activity of Broach always peaceful; the *Periplus* records that the authorities endeavoured to break the trade of rival ports on the Bombay coast by means of blockade, and by towing away foreign ships making for those ports.

So much for the sea trade of the Western Coast of India—knowledge meagre and scanty and amounting to little more than an assurance that Indian ships, manned by Indians, did share with Arab ships in the trade between India and the Persian Gulf, and with Aden and the East Coast of Africa, from very early days, and that a well-developed coasting trade, in spite of harassment by local pirates, was carried on by Indian ships between West Coast ports. This trade was exactly upon the lines of present-day sea-commerce as carried on by Indian merchants in vessels built and manned in India—proof of the conservatism of commerce as well as of its antiquity.

Sea-trade upon the East Coast never became well known to the Alexandrian Greeks or to the Romans; on the other hand much more information upon this aspect of ancient Indian enterprise is contained in Indian inscriptions and documents, and proved in indirect ways, than in the case of the West Coast trade. Thus the records of Indian and Sinhalese dynasties frequently record naval expeditions against overseas nations. Vijaya and his followers, the founders of the ruling section of the Sinhalese nation, are reputed to have reached Ceylon about 550 B.C. from some port at the head of the Bay of Bengal, and for centuries thereafter Sinhalese chronicles and South Indian inscriptions testify to the frequent invasions of Ceylon by Chola and Pandyan armies, and even to occasional counter-invasions of South India by Sinhalese. Boats of considerable size must have been employed, as mounted troops are mentioned; horses, elephants, and chariots also passed as marriage dowries between the Royal Houses of South India and Ceylon.¹ So far as we know, the Indian ports of departure were chiefly on the Tanjore and Ramnad coast of Palk Strait. Kaveripattanam on the Coromandel coast was then at the height of its fame. Both Greek and Tamil writers mention it, and have much to say of its sea-borne commerce. The *Periplus* is the most definite; here towards the end of the narrative after speaking of Kolkoi (the Pandyan city of Korkai) and of the pearl fishery coast on the Gulf of Mannar, we are told:—

¹ *Mahavamsa*, 1889 Edition, p. 34.

"Among the marts and anchorages along this shore to which merchants from Damirike¹ (Malabar Coast) and the north resort, the most conspicuous are Kamara (Kaveripattanam), Podukē and Sopatma,² which occur in the order in which we have named them. In these marts are found those native vessels for coasting voyages which trade as far as Damirike and another kind called *Sangara*, 'monoxyla' of the largest sort, and also others called *Kolandiophonta* which are of great bulk and employed for voyages to the Ganges and Khruse"³ (Golden Chersonese or Malay Peninsula.)⁴

Besides these references we have records of the invasion by sea (*circa* 1025 A.D.) of the Burmese coast by South Indian (Chola) powers and it is certain that Indian kings during the early centuries of our era carried their arms by sea to the coasts of Sumatra and Java, where indeed a peaceful Indian penetration had begun probably some centuries B.C. Particularly marked was the extension of Indian commerce in the time of Chandragupta, a great warrior statesman brought to the front by the impact of Europe upon India. It is even probable that he was of the Persian royal family as Dr. Spooner has argued, and Greek influence may have had much to do with the energy he infused into the commercial intercourse of India with the outer world. In his day great progress was made in traffic with the far east and it is probable that even then (316-292 B.C.) Hindus began to found settlements in Java, Siam and Cambodia, and to introduce Brahmanism into those countries. Trade with Chavakam, meaning Sumatra and Java, is alluded to frequently in several of the very old Tamil poems quoted by Kanakasabhai Pillai in his *Tamils 1800 years ago*. The early Arab writers indeed considered Sumatra and Java as being part of India.⁵ Abu Zaid (*c.* 916 A.D.) relates a story of an old invasion of the Pandyan country by the Maharaja of Java—incidentally mentioning that it was about 10 days' sail between the two kingdoms, "but when the wind is light the journey may take as much as 20 days."

The frequent references to countries on the northern and eastern shores of the Bay of Bengal and to Java and Sumatra further east, in the oldest classical writers of South India, show very clearly that intercommunication was easier and more frequent than we usually realize, and this infers fairly large and seaworthy vessels.

From very early days trade between Ceylon and Bengal was important. The chank bangles esteemed so necessary by Hindu ladies in Bengal were obtained entirely from the South Indian and Ceylon fisheries and the muslins of Bengal returned in exchange. Fa Hian, the Chinese Buddhist who travelled in India between 399 and 414 A.D., is one of the first writers who specifically mention this Bengal mercantile shipping in ancient days; in a passage describing his pilgrimage to see the Buddhist

¹ I adopt Damirike in place of the Limurike of the MSS. as suggested by Rawlinson, *loc. cit.*, p. 120.

² Podukē may be Pondicherry (Puducheri) as suggested by other authors, but I believe Rawlinson is in error in identifying Sopatma with Madras. It is more likely to be represented by the now decayed port of Kistnapatam further north.

³ Probably *sangara* were double-canoes (*sangādam*, Tamil), while *kolandiophonta*, or *kolandia* as Schoff prefers to call them, were possibly outrigger ships. See p. 215 for a discussion of this question.

⁴ As instance Al Masudi, who died 956 A.D. Sumatra was usually confounded with Java under the name Zahaj.

relics in the possession of the Sinhalese, he relates how he sailed from the mouth of the Ganges to Ceylon in "a great merchant ship." In 673 this port, Tamralipta or Tamluk, near the modern Midnapore, was found still prosperous by the later pilgrim I-Tsing, who there embarked when returning to China.

In the sixth century we get considerable light upon the mercantile importance of Ceylon in the writings of that much travelled Alexandrian monk, Kosmas Indicopleustes,¹ who wrote about 535 A.D. To quote his own words: "As the position of Ceylon is central, the island is a great resort of ships from all parts of India, and from Persia and Ethiopia, and in like manner it despatches many of its own to foreign ports. And from the inner countries, I mean China and other marts in that direction, it receives silk, aloes, clovewood, sandalwood, and their other products, and these it again passes on to the outer ports, I mean to Malabar where pepper grows and to Kalliana (near Bombay) where copper is produced and to Sindu also and to Persia and the Homerite country (S. Arabia) and to Adule" (Abyssinia).

The connection between the country known in ancient days as Kalinga—the land stretching from the Godaveri to Ganjam—and the opposite coast of the Malay Peninsula has always been great. The only good harbour on the Ganjam coast is called Kalingapatam, and the port of Coringa (apparently etymologically identical with Kalinga) has long been the greatest shipbuilding centre on the East Coast so far as we have definite information. From the former port in particular emigration has been active from time immemorial, hence it is easy to understand why the name of Klings is universally given to people of Indian race in the Malay Peninsula, whether they be the descendants of old settlers who doubtless did come from Kalinga or whether they are newly arrived immigrants from parts far distant from that locality. In the same way Lower Burma or Pegu being conquered by emigrants from Telingana, the land of the Telugus, comprising the coast region from Madras to the southern border of Ganjam, the people of Pegu were long known to the Burmese and to all foreigners as Talaings.²

It follows therefore that the most conclusive proof of the high development of purely Indian overseas trade in ancient times is afforded by the great colonizing epoch of the first seven centuries of our era. Within this period, at ill-determined dates, several waves of colonizing energy carried large bodies of Indians from the north-western shores of the Bay of Bengal, Telugus or Talaings from Telingana, Klings from Kalinga, and a Magadha element from Bengal, to Pegu and the Tenasserim coast, to parts of Sumatra, to Java and to Cambodia. The written records have gone, tradition is scanty and unreliable, but stone monuments remain in plenty and in unrivalled magnificence that bear silent witness to Indian inspiration and workmanship. The colonists appear to have represented the three chief phases of Indian religious feeling; Brahmanism, the oldest, was succeeded by Buddhism, made vivid to us in the wonderful sculptures of Boro Budur; this latter religion, once predominant in Java, gave

¹ *Christian Topography*, 11th Book.

² Phayre, *History of Burma*. It may also be noted that the Telingana and Kalinga coastal limits largely overlap and represent almost the same region. The latter term is the older. It represents the name of an ancient kingdom whereas Telingana is a racial term indicating the area occupied by the Telugu branch of the Dravidian race.

place in turn to modern Hinduism, which lasted in strength till late in the 15th century, and still flourishes in Bali and lingers in out-of-the-way villages in East Java.

Javanese tradition traces this Indian colonization back to 75 A.D., Indian influence and intercourse being certainly much older, dating back at least to Asoka's days. However unreliable this date of the first Indian colonization may be, it represents a time which approximates to the probabilities, for the Chinese pilgrim Fa Hien at the beginning of the 5th century found a large Indian population in Java, and sailed in ships upon this memorable voyage with crews professing Brahmanism,¹ whilst his successor, I-Tsing, about 673, mentions more than ten prosperous Indian colonies in Sumatra, Java, Borneo, Bali, etc.

The leader of the first legendary arrival of Indian colonists in A.D. 75 is said by the Javanese to have borne the name Adi or Aji Saka and in this it is possible that we have a vague record of the activities of the great Asoka, who in 244 B.C. commenced that wonderful Buddhist propaganda which spread Buddhism far and wide through India, Ceylon and the whole south-east of Asia. As Mr. V. A. Smith remarks, "when we remember Asoka's relations with Ceylon and even more distant powers, we may credit him with a sea-going fleet as well as an army".²

In this connection Mukerji's quotation³ of a passage from a Kashmir work of the 10th century, preserves a very interesting tradition of Indian trade with the island powers of the east in Asoka's times. From it we gather that certain Indian traders had been attacked in their voyaging by Naga pirates who plundered and destroyed their ships. In the steps taken by Asoka to exact redress it is not unlikely that we have a far-off echo of a maritime punitive expedition against Malay or Malayo-Polynesian pirates.

Whatever may be the truth of the Javanese legends, it is, as we have seen, certain that Indian emigrants landed in considerable numbers in Java and Sumatra long prior to the 5th century. For this century and the beginning of the seventh, Javanese tradition is very definite regarding large arrivals from India. In regard to the latter immigration, the legends aver that in 603, a Gujarat ruler, forewarned of the coming destruction of his kingdom, sent his son with 5,000 followers in 6 large and 100 small vessels to Java, who were reinforced later by over 2,000 more men, including numerous skilled artisans.⁴ Many critics deride this story which they characterise as baseless; they point to the belief that the bulk of the Javanese colonization was from the Kalinga and the Orissa coasts and emphasize the improbability of settlers arriving from the far western coast of India. These objections, I incline to think, are not necessarily conclusive. For centuries Java was the El Dorado of India where the adventurous, the ambitious, the rebellious, and the discontented sought power or wealth or refuge, standing in relation to India as the colonies have done to Britain for three centuries and more. Given these motives there is no insuperable or even considerable difficulty in the voyaging of large numbers of emigrants from

¹ He lamented "In this country (Java) heretics and Brahmins flourish, but the law of Buddha hardly deserves mentioning."

² *Edicts of Asoka*, p. viii.

³ Mukerji, R., *Indian Shipping*, p. 114.

⁴ Raikes, Sir S., *History of Java*, II, 82.

Gujarat to Java in the 7th century. The Chinese were at that time regularly trading to Gujarat and the Red Sea, and Arab trade with the Malay Archipelago and with China was also considerable. With these two streams of foreign traffic passing Indian ports, the coast people of Gujarat would be early familiarized with stories of the wealth of the Indian colonies in Java and Sumatra, and what more likely than that the adventurous among them, *provided as they were with the best-built sea-craft of any in India*, would themselves desire to take part in the rush to the Isles; finding the reports true, if political conditions were threatening at home, is it not probable that Gujarat should take a share, belated though it might be, in the colonization of the Malay Isles?

Can there be an echo of this in the quotation in *Hobson Jobson* (1903 edn.)?—

“There is a saying in Goozerat,—
Who goes to Java
never returns.
If by chance he return,
Then for two generations to live upon,
Money enough he brings back.”

(1856. *Rās Mālā*, ii, 82).

Before we can understand the full significance of the Indian colonization of Java and the neighbouring lands, we must force ourselves to realize as vividly as possible that there was infinitely more movement in Asia during the first thousand years of our era than there is now. Many Governments were unstable and every ambitious prince dreamed of subduing his neighbours; out of this welter ever and again emerged a great warrior at the head of conquering hordes who spread terror and unrest far beyond the limits of his operations. Fugitive populations pressed upon adjoining lands, and this impetus once imparted, reacted again and again till it reached coast lands and excited the more adventurous to seek happier homes in new countries. Such forces as these sent multitudes of Indians to Java and Sumatra and to Cambodia, where the early comers quickly founded prosperous states and became so powerful and wealthy that the fame thereof brought new accessions of colonists, this time principally craftsmen—builders in stone, expert sculptors, workers in metal and in wood.

A fact which lends some support to the Javanese claim to early intercourse with Gujarat is that the Portuguese on reaching Malacca in 1509, found the trade with India largely in the hands of merchants from Gujarat.¹

¹ Stephens, H. M., “Albuquerque,” in *Rulers of India series*, p. 96, Oxford, 1892.

PART IV.—THE CLASSES OF VESSELS EMPLOYED BY INDIANS IN ANCIENT DAYS PRIOR TO PORTUGUESE MARITIME DOMINANCE.

Until we come to the days of Marco Polo and Ibn Batuta I know of no technical descriptions of the boats and ships used on the Indian coasts, except one by Pliny and the involved and difficult passage in the *Periplus* already quoted, where two Indian trading vessels called respectively *sangara* and *kolandiphonta* are mentioned, the former being large 'monoxyla,' which means literally that each vessel was formed from complete logs and not constructed of planks. I agree with Schoff¹ in correlating the name with the Tamil *sangādam*, a double-canoe made from two great hollowed out tree trunks lashed together, in spite of the fact that this type of craft is never used nowadays for sea-going purposes, being restricted to rivers, estuaries and backwaters. The word, as well as the use of this form of canoe, is found throughout Dravidia; on the Malabar coast the term appears as *changādam*, in Kanara as *jangāla*. The Polynesians when first seen by European voyagers employed sea-going double canoes of large size; to-day few exist and these of small dimensions only, the large ones being replaced by schooners of European design. If, as I believe, there is an infusion of Polynesian blood in the coastal population of South India, we can the more readily agree with the view that large double-canoes were employed in trade on the Coromandel coast at the time of the *Periplus*. The only alternative to this view is to consider the monoxyla making up a *sangara*, as the constituent logs of a catamaran. But catamarans are never used as cargo carriers; they are exclusively fishing boats and this fact excludes them from identification with the description of them in the *Periplus* as "large vessels."

Kolandiphonta or *kolandia* as rendered probably more correctly by Schoff, described as vessels of great bulk employed for overseas voyages to Bengal and Malaysia (Chryse), must almost certainly have been two-masted vessels with pointed ends and probably equipped with a stout outrigger, counterparts of the present-day Sinhalese *yatra-oruwa* (*yatra-dhoni* in Tamil), but, unlike them, steered by quarter oars, the rudder not being then invented. I come to this conclusion partly because *kolandia* appears to be a Greek sailor's rendering of the word *kullan* or *kulla*, the Tamil term both for a large outrigger fishing canoe and for the outrigger frame alone (*kullān*, the more correct and older form becomes shortened to *kulla* in the corrupt speech of Tamil fishermen), and partly from Pliny's account of the ships used in the seas between India and Ceylon.

It is indeed a strange coincidence that this view of *kolandia* being outrigger vessels should receive valuable support from Pliny, who says, "the sea between the

¹ *Loc. cit.*, p. 243.

island of Ceylon and India is full of shallows not more than six paces in depth, but in some channels so deep that no anchors can find the bottom. For this reason ships are built with prows at each end, for turning about in channels of extreme narrowness."¹

Now the large single outrigger type of canoe, called *kūllān* or *kūlla* in Tamil, used universally by Sinhalese fishermen at the present day, in common with several Polynesian varieties of the same general design, is notable among our local boats for this same strange peculiarity. In such craft the single outrigger must be always upon the weather side to exercise the counterpoise needful to prevent capsizing through the thrust to leeward of the wind upon the sail. The heavy outrigger of these large canoes cannot be changed at sea from one side to another, as it has to be permanently secured on one side; whenever the wind changes in direction or a course contrary to the one preceding has to be steered, the difficulty involved is overcome by moving the steering paddle to the opposite end of the boat, thus changing what was before the bow into the stern. By this means the outrigger float remains on the weather side.² From this fact I identify Pliny's "ships with prows at each end" with outrigger vessels closely akin in form to the *yatra dhoni* of the present-day Ceylon coasting trade and with the *kolandia* of the *Periplus*.

The reason given for these boats having reversible ends is, of course, wrong, but this is immaterial.

The *kolandia* of the first century probably had also fairly close kinship with the two-masted Javanese outrigger ships of the Boro Budur sculptures (*circa* 8th or 9th century) seeing that the *Periplus* distinctly states that the *kolandia* traded to Chryse, generally identified with the Malay Peninsula; the islands of Sumatra and Java, where Indian missionaries were at that early period already busy spreading Indian religion and prestige, were undoubtedly included in this region of the Golden Chersonese.

It is somewhat curious that no descriptions of sea-going vessels appear to have survived in the Tamil classics; all that Bishop Caldwell could say was that at a very early date, besides "canoes" and "boats," the Dravidians had "ships" in the sense of small-decked coasting vessels.

Thanks, however, to the *Periplus* and to Pliny, we do possess evidence that they had in addition oversea trading vessels and that some of these were probably outrigger ships. That other large ships, most likely from more northern sections of the east coast of India, were without outriggers, either then or at a date not much later, is certain from the fact that various Andhra and Kurumbar coins bear rude but unmistakable representations of two-masted ships without outriggers; all appear pointed at both ends, and were steered by a quarter oar on each side.³

¹ Pliny, VI, 22, M'Crindle's translation.

² Pitt-Rivers states that this system is also pursued in Fiji, in parts of New Guinea, and, northward, in the King-mill Islands. *The Evolution of Culture and other Essays*, Oxford, 1906, p. 222.

³ Schoff, *loc. cit.*, p. 243, states that these coin ships present points of detail resembling those of "the Gujarati ships of Borobodur." In reality, the converse is the case. The Indian ships have pole masts, the sails are without

From Marco Polo's account of the Arab vessels at Ormuz, it is clear that these were much more like the Laccadive Island boats than the Arab carrying craft of the present day as represented in the baggalas, dhangis and gunjos of the Persian Gulf and West Coast of India. These latter mostly have two masts and all are put together with iron bolts and have the bottom pitched. Marco Polo specially notes that the Arab ships seen by him at Ormuz (*c. 1272* and *1291*) had but one mast, one sail, one rudder and no permanent deck and that the planks were sewn together with coir yarn, the bottom being smeared with fish oil but not pitched.¹ Such is essentially the structure of the Laccadive boats, though these show such improvements as a covered-in poop and the frequent employment of a small mizzen mast. Marco Polo also remarks that they had no iron anchors. This traveller having had intimate experience of the magnificent junks built by the Chinese, which, even then, boasted the employment of numerous watertight compartments separated by transverse bulkheads, were four or six masted, had numerous sails and accommodated wealthy passengers in commodious state-rooms, thought poorly of the vessels built by the Ormuz Arabs. He says they were of the worst kind, and dangerous for navigation, their defects proceeding from the fact that nails were not employed in their construction. This poor opinion must have been due largely to prejudice for such boats are still used successfully and do not seem to be more dangerous than ironbolted vessels. In certain circumstances they have even considerable advantage and Ibn Batuta was right when he wrote (A.D. *circa 1340*) that "the ships of India and Yemen being sewn together with coir thread, when they happen to strike against a rock, the thread will yield a little but will not soon break, contrary to what happens when put together with iron nails."²

Marco Polo states that in these vessels after taking in their lading, this is covered over with hides, whereon they place the horses which they carry to India—a statement bespeaking their large size.

We see from the above that the Indian and Arab vessels of the Persian Gulf and the West Coast of India at the end of the thirteenth century were large enough to carry considerable cargo together with a number of horses; they were apparently much like a single-masted pattimar of the present day but differed from the baggala in having no high poop; it is likely that they were round or sharp sterned and it is probable that they had already adopted the lateen rig ("one mast and one sail," Marco Polo, *ut supra*).

This general form appears to have been prevalent on the West Coast from time immemorial and probably originated from the habit still seen at Ratnagiri and the neighbouring coast of making even fairly large boats out of dug-out canoes by adding flared side or wash-boards, one above the other, to the edges of the dug-out. The added planks were originally sewn edge to edge as in Laccadive boats, the out-

booms and no outrigger is present; those of Boro Budur show twin-masts, the sails have booms as well as yards, and outriggers, often with multiple booms, are a characteristic feature. Neither has Schoff any justification for calling them Gujarati ships; they were local Javanese vessels, with lineal descendants of smaller size still surviving in the coasting trade of East Java.

¹ Yule's edition, Vol. I, p. 103, 1871.

² *The Travels of Ibn Batuta*, Lee's translation, p. 178, London, 1829.

rigger dhonis of Ceylon, and the masula boats of the East Coast. When larger boats become necessary, the model of the built-up dug-out was followed and this design is now seen in the round-sterned pattamars of the present day. Such boats being beamy had no need for a steadyng outrigger.

In the extreme south of India and in Ceylon, a different basal design appears to have existed for cargo carriers. In this area the boats employed for transport work, as apart from catamarans which are solely fishing craft, appear undoubtedly to have been of two kinds, either true single outrigger vessels of the Polynesian type, or the modified balance-board design which has been evolved therefrom. Both of these types

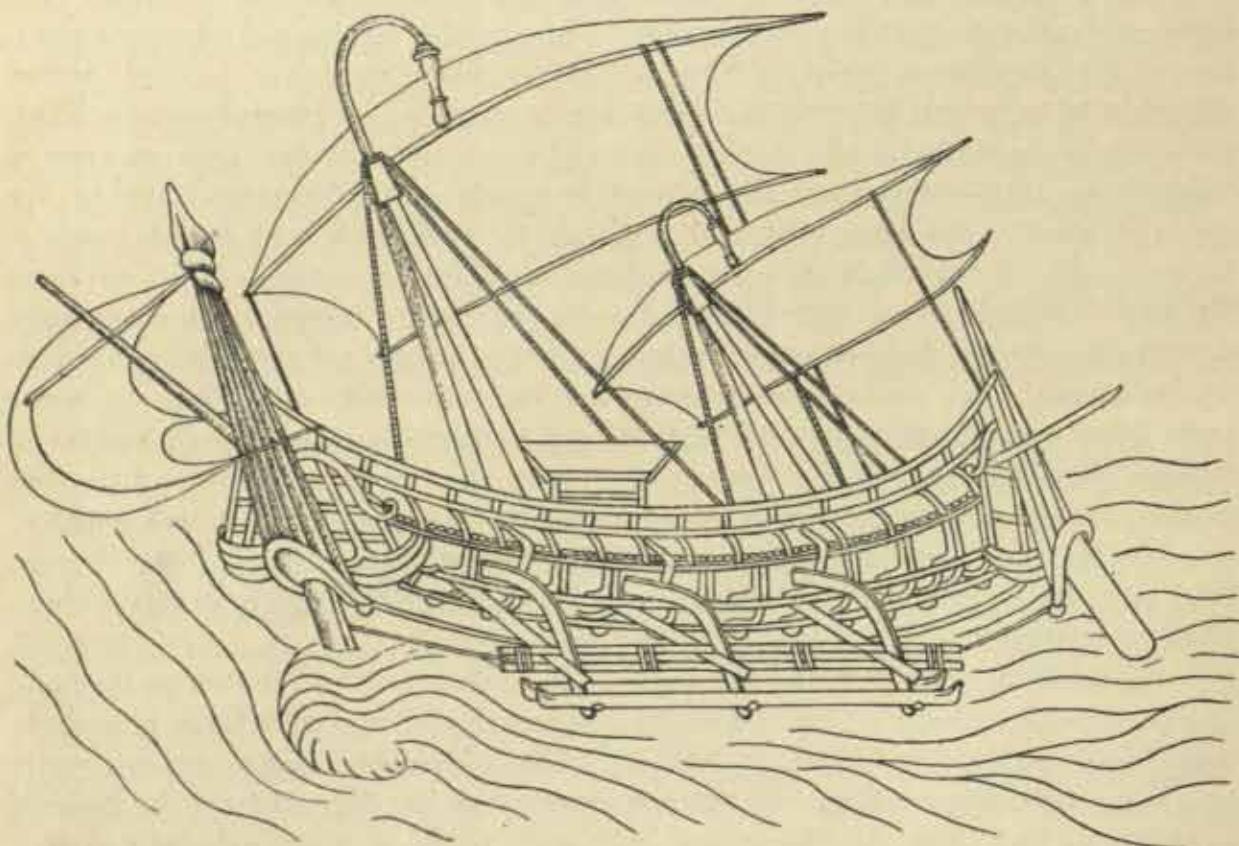


FIG. 28.—A large Javanese outrigger ship of 8th or 9th century A.D., showing the double form of mast and the quarter steering oar in a trunkway. Restored from the Boro Budur sculptures, Java. (Original.)

are still to be found in Palk Strait and on the coast of Ceylon, the former running to 50 to 70 tons capacity, the latter to about 30 tons. The true outrigger type is by far the more numerous and the more widely dispersed in India, as I have seen canoes and boats of this construction at frequent intervals from Sind in the north-west, down the Bombay coast to Mangalore and again from Ceylon in the south to Cuddalore and Kille (Cauveri River) on the East Coast. The balance-board modification I know in two localities only—the one being Palk Bay, the other the vicinity of Cocanada (Kalinga coast).

Very significant in this connection is the fact that several of the sculptured

friezes on the great Buddhist shrine of Boro Budur (*i.e.* "Great Buddha") in Java, erected in the eighth or ninth century, show large two-masted vessels provided with a massive outrigger formed of a compound float, held in position by either three or four stout booms¹ (fig. 28). As Boro Budur was built by Indians or under the direction of Indian rulers, architects, and foremen, these sculptured representations go far to substantiate the view I take, based upon the many disconnected survivals of the outrigger design on Indian coasts, that certain of the ancient trading vessels of South India and Ceylon were furnished with outriggers; that the Ceylon sewn-plank outrigger coasting dhoni, and the Point Calimere kalla dhoni, represent survival modifications of the original type of South Indian trading vessel in use when sea-trade first arose.

At the same time I agree with Mr. R. D. Banerji² that the Boro Budur ship scenes cannot be accepted as representing the emigration of Indian colonists to Java. They undoubtedly represent incidents in the life of the Buddha and what they do show is the type of Javanese ship familiar to the Boro Budur sculptors. A large square sail is carried on each mast, while from the bowsprit is hung a square artemon or spritsail. In the smaller vessels, a large steering oar is hung on the port quarter; there must have been a corresponding one on the starboard side. The larger two-masted type shows the rudder passing upwards into a trunkway such as the Chinese use in their junks; it has the appearance of being set laterally, hence it would seem that these vessels used two separate Rudders precisely as the large Malay praus to be seen in Macassar harbour have at the present day. In these latter, as I had the opportunity of seeing recently, there is an opening or window in each quarter, considerably below the poop deck, which provide the steersmen with access to the two large Rudders—one on each side. The Boro Budur ships customarily show a steersman clinging to the upper portion of the rudder blade—a conventionalism similar to that which represents a sailor working his way along the bowsprit.

In some (fig. 29), the simpler quarter rudder is retained, apparently held in position by rudder bands as seen in representations of Roman cargo ships.

The superstructure above the waterline appears to be built outboard beyond the sides of the hull proper, similarly, but far more developed, to that seen in many Macassar praus. To obtain lightness, this superstructure was built with the wales separated by spaces—openwork bulwarks which in the largest Boro Budur ships suggest "basket-work." The smaller vessels lack this or show only a few added open wales of quite ordinary dimensions and pattern.

¹ No Indian or Sinhalese outrigger boats have more than one float supported by two booms, and the same design is characteristic of the outlying Polynesian islands; multiple booms, three and four most commonly but occasionally as many as ten and used in combination with a float on each side are still frequent in the Celebes, Moluccas, and Melanesia. The size of Polynesian outrigger canoes is now much smaller than in pre-European days, the large sizes having been supplanted by island-built schooners. In the Marshall Islands and elsewhere outrigger canoes of 60 to 70 feet in length are said to have been common prior to the advent of the white man, and long distances were travelled in them, many families taking passage. For an interesting account of Polynesian outriggers see *Notes on the Boats, Apparatus and Fishing Methods of the South Seas*, by A. B. Alexander, in the Report of the U.S. Fish Commission for the year 1901, Washington, 1902.

² *The Modern Review*, Calcutta, August, 1917.

A point of much importance in these representations is that the masts are compound, being double or twin in form; they consist of two spars stepped some feet apart, but inclined so that their upper ends eventually meet. So far as we know this design has never been used in India, but the double mast is in use in Burma, while a variant in the form of a tripod still persists in the Celebes and Moluccas. Some sculptures have numerous rungs or cross-bars attached, such as are seen to-day in the big Macassar praus and in up-country Burmese lighters on the Irrawaddy. The simple A-form is noteworthy as the mast design seen in ancient Egyptian ships from the 3rd to the 11th dynasties.

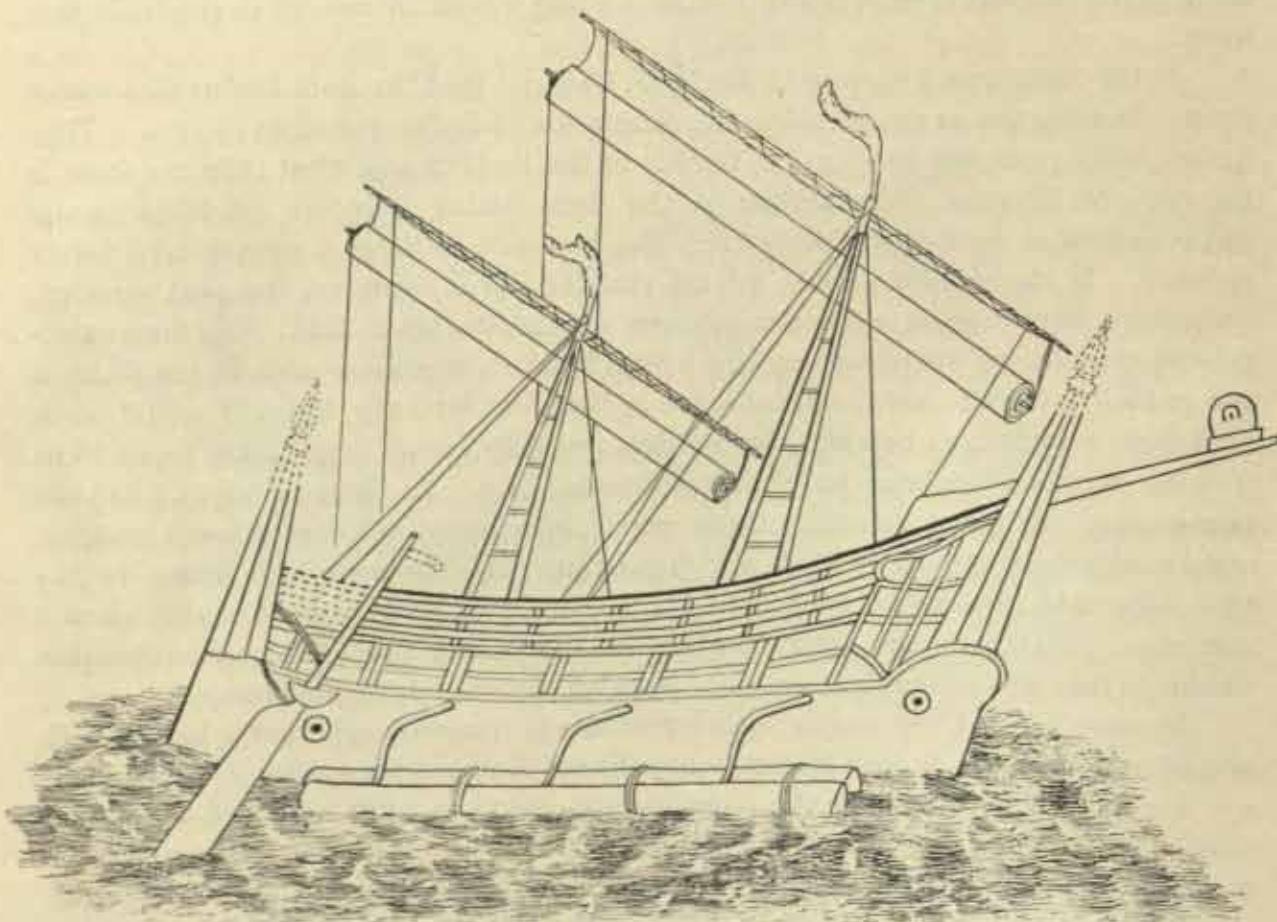


FIG. 29.—Restoration of a small Javanese outrigger ship of about 8th or 9th century A.D. From the Boro Budur sculptures, Java. (Original).

This peculiar compound mast (now indicated for the first time) together with the two rudders set in trunkways, are the weightiest arguments I know against the inference that the Boro Budur scenes referred to, depict the arrival of Indian ships in Java.¹ I can find no survival or suggestion anywhere of compound masts or of rudder trunkways having ever been used on the Indian Coast. Very important evidence on the former point is furnished by the ship-coins of the Andhras, dating

¹ Rawlinson's frontispiece "A Hindu ship arriving at Java" and Mukerji's similar one entitled "Indian adventurers sailing out to colonize Java."

back to the second and third centuries A.D., whereon are depicted two-masted ships with straight masts showing no trace of being either double or tripod in form. On the other hand, neither do these representations of ships show any suggestion of an outrigger or even of a balance board. They are ordinary round ships, two-masted, carrying yards triced to the mast-heads in such a way that it is clear they carried a large square-sail on each mast. Bow and stern were both raked and they were steered by means of two quarter-paddles, though in some only the paddle on one side is shown.¹

I am inclined to think that the Andhra sea-going ships and those fitted out from the Kalinga and Orissa coasts in the early centuries A.D. were square-rigged, two-masted vessels, with raked stem, and stern, both sharp, without bowsprit and rudder, and steered by two quarter paddles. It was in vessels of this description I believe, that the first Indian colonists set sail for the Malay Archipelago. Subsequently when the upper west coast of India began to send out swarms of colonists (if it ever did) and when trade with Ceylon and the south-east coast assumed importance some of the vessels used may have had outriggers as in the Boro Budur ships, the Ceylon *yatra dhonis* and the Konkan fishing boats of the present day. The combination of compound masts with a powerful outrigger (the latter now very seldom seen in Javanese cargo craft), and with the rudders set in trunkways, which we see in the larger ships of the Boro Budur friezes, must have been of local evolution, perfected by the Javanese in later years, as Boro Budur though began presumably in the 7th or 8th century was not completed probably till the 10th, some hundreds of years after the active period of Indian colonization. This peculiar design combined three essentially present-day Malaysian features—the double outrigger, the compound mast and the system of double rudders. Compound masts are essentially Mongoloid in origin, being seen to-day only among the Burmese, the Indonesians and the Southern Chinese.

On the west coast of India it is probable that the employment of the outrigger for coasting vessels was discarded at a comparatively early period, due, I believe, to the influence exerted upon this coast by foreign seamen from the Persian Gulf and the Red Sea; on the less accessible south-eastern coast, foreign influence did not become strong till some short time prior to the coming of the Portuguese, hence the outrigger type prevailed there as the common design till long after the conversion of Java to Buddhism. With the coming of the Arabs and still more quickly after the arrival of the Portuguese, the outrigger cargo-carrier began to decline, till now we find a mere handful of boats of this design engaged in trade. These few are rapidly disappearing and it is probable that none will exist twenty years from now. Twelve years ago the Ceylon outrigger cargo boats were familiar to me as they passed up and down the coast near the Ceylon pearl-banks; to-day few seem to know of their existence.

As the single outrigger and balance-board designs are both Polynesian in affinity, from the general diffusion of one or the other on both our Indian coasts, the only sane conclusion we can come to is either that some of the coast folk of India are

¹ Rea, A., "South Indian Buddhist Antiquities," *Archaeol. Surv. India, New Imp. Ser.*, Vol XV, p. 29.

closely kindred to certain of the races of Oceania, or (much less probably) that there has been such intimate and extensive trade relations between India on the one hand and Polynesia on the other, that the latter region imposed its boat designs upon India.

As regards the latter possibility, we have already seen that within the historic period the flow of population has been almost entirely from India to the Further East and that even so, it has been restricted entirely to Malaysia so far as the island world is concerned—never to the regions further east. Even for the former restricted area there is little or no evidence of any reciprocal influence upon India, with the one probable exception of a very limited Malaysian wave of immigration *via* Ceylon, which brought coconut cultivation, toddy tapping, and possibly betel chewing, to India from the Malay Archipelago. The Shanars, Izhuvans and Tiyavans of South India probably owe their presence to such immigration. The anthropological facts (p. 234) in regard particularly to the Shanars, give distinct support to this conclusion.

To-day, however, we find very few Malay words in common use on the Indian coasts, whereas a very large number of words of Indian origin, the great majority being traceable to Sanscrit and a less number to Dravidian languages, have gained admission in varying degree to the languages of Malaysia. The Indian immigrants into Sumatra and Java were of infinitely higher civilization than the inhabitants they found there—no record of pre-Hindu culture exists, and from all we now know, we judge that the aborigines were animists with rude customs and habits. Hence the civilization of the newcomers from India had no difficulty in asserting its supremacy and with the spread of the new and higher religion, the tongue of the sacred Indian writings rapidly influenced the language of those of the natives admitted to social intercourse with the Indian immigrants, who formed in addition alliances with the influential families of the land.

In this connection it is significant that the Malay term for a large ship, *kapal*, has been borrowed from the Dravidian (Tamil கபல்). The Malay of the Straits and the Tamil of India and Ceylon alike use this word for a large or sea-going vessel. Conversely the names for small boats used for fishing and inshore purposes are wholly different in Malay and in Tamil. From this we infer that the first large over-seas vessels seen by the Malays were Dravidian ships from South India.

The modern boat design of the west coast of India as exemplified in the sharp or round-sterned pattamar, is, I believe, as stated above, a local development of the spread dugout. So, we arrive at the broad conclusion that till quite recent times all the evidence available points to Polynesian influence being the only outside one that affected Indian sea-craft to any appreciable and permanent extent prior to the 16th century, excepting always the catamaran, whereof the primal origin is to be sought in the reed-rafts of Egypt and Chaldea.

In regard to inland boat designs we are on a wholly different footing. The types seen on the great rivers of India fall into two distinct classes, the first and larger group having distinctly Egyptian affinities, the other with equally well-marked Babylonian relationship. The former is by far the more marked and emphatic; no

one seeing a crowd of Hoogly dinghis, if he has any acquaintance with Egyptian paintings and remains, can fail to be struck by the similarity between the Indian design and that of the ancient small boats of the Nile. Indeed the Ganges to-day in respect of the craft covering her waters, presents a scene much more like that common on the Nile in the days of the Pharoahs than is its present-day aspect. We have the same multitude of high-sterned, low-prowed boats steered by a single paddle at the stern, while in larger craft we have the same design carried out on a greater scale, the high curved stern retained while the forward part is kept low to permit the use of oars. The Egyptian square sail is conserved and, most remarkable of all, in the great river cargo boats of the Ganges many of them retain the primitive quarter steering paddle favoured in ancient Egypt, and in both the shaft of the paddle is provided with a cross bar or tiller at one side, some distance from the end, for its easier manipulation by the steersman. Figures 26 and 27 show the identity of the idea involved as practised by the ancient Egyptians and the river-men of Bengal. In cases where a rudder is used in the larger boats, it assumes the balanced form in which a considerable portion of the blade is placed forward of the turning axis exactly as in the fixed quarter steering paddle from which it is evidently evolved.

A still older form of rudder is seen on the upper Indus; there the larger river craft are usually steered by an extremely long oar over the centre of the stern. In this we have a survival of an Egyptian practice in use in the time of the Twelfth Dynasty and for some time preceding. Models showing this point clearly have been found by Prof. Flinders Petrie in tombs of the former period.¹ Prior to the adoption of this method, Egyptian river craft had been steered by several paddlers, who stood on the overhanging counter. The next development was to have a powerful steering oar suspended on either quarter—a notable sequence, as the natural inference, did we not have this Egyptian evidence, is to deduce the modern rudder from the median steering oar of the 12th dynasty vessels.

In still another detail—the oculus—do Indian river craft show their affinity with ancient Egyptian types. The cargo carriers of the Ganges such as are to be seen at Benares unloading stone and firewood often show an ornamental brass “eye” on each bow (Pl. VI, fig. 4). In Egypt this oculus, with eyebrow shown almost exactly the same in detail as we see to-day in the Ganges boats, was placed on the funeral boat wherein the mummy of the departed was ferried across the Nile to the tomb. It symbolized the eye of Osiris guiding the dead on the voyage to that other land not to be entered without the aid of this deity and his shallop. The Romans and Greeks extended the practice; they endowed all their sea-going vessels with the oculus, a custom still lingering in the south of Italy. In Indian waters the only survivals I know are upon Ganges cargo craft, the Kallathoni of Point Calimere and the Hindu coaster of the north of Ceylon (Pl. VI, figs. 3 and 2). In ancient India the custom was widespread.

¹ Chatterton, E. Keble, *Sailing Ships*, London, 1909, p. 34.

Babylonian affinity with Indian river craft, is seen in two instances; the first is the wicker coracles used on the Tungabhadra, the Cauveri and a few other rivers (Pl. V, fig. 6), the other is the ornamentation of the passenger barges of Benares.

The coracles of Indian rivers approximate in construction closely to those described by Herodotus as used by the merchants of Assyria to convey their goods down the Tigris. Alike in the ancient Mesopotamian and the modern Indian coracle, the craft was made water-tight by covering the outside with hides, thereby differing from the modern coracle or guffa of the Euphrates and Tigris which is coated with pitch. The Indian coracle, like its Chaldean relative, sometimes attains quite a large size, up to 12 or even 14 feet diameter across the mouth; small ones are used largely to ferry passengers across rivers, while the larger are used for bulky or heavy transport downstream. I cannot however accept the statement of Herodotus that the Tigris coracle could carry 5,000 talents weight, for taking the talent at 60 lb., this would involve a burden of over 130 tons. Indian coracles have, however, been used for the transport of a 12-pounder gun with half-a-dozen soldiers and a couple of boatmen, and are in regular use by M. and S.M. Railway engineers in flood-time bridge repairs.

A second Babylonian affinity with India seems to survive in the ornamentation of Benares ceremonial barges with a boldly executed figurehead both at the bow and at the upcurved stern.

In this connection it is notable that the Phoenicians were in the habit of ornamenting their vessels with a small image of one of their deities, which Herodotus states was placed on the prow as a figurehead; Hesychius and Suidas however say it was placed on the poop. The figures of Phoenician ships that have come down to us are all of war galleys with low ram-shaped prow, and these do not show any figurehead; if one was used it may have been upon their merchant ships only. In any case the forepart of Phoenician vessels was low and had not the upward curve seen in Chaldean and Benares barges.

PART V.—THE LIGHT SHED UPON EASTERN ETHNOLOGICAL, PROBLEMS BY INDIAN BOAT DESIGNS.

I entered upon the present enquiry largely with a view to ascertain if any evidence is forthcoming from this source upon the supposed trade connection between Phoenicia and India in ancient days. I felt however that some connection would also be found with the Malay Archipelago, as the significance of the outrigger canoes of South India and Ceylon had early occurred to me. I was not however prepared to find, as I have done, that no evidence whatever exists of any Phoenician trade influence, and I was still more unprepared for the extreme weakness of the Malayan connection coupled with the strength and importance of Polynesian affinities. These latter are so strong that I cannot see how ordinary trade communications on the extremely limited scale which ancient commerce alone permitted between places so far apart could have brought about such close relationship, particularly when we note that Indian history gives no hint of any commercial relations having existed between India and the present-day users of the single outrigger in Oceanic lands, and that no Austric language appears to be represented among Indian coast people.

Some of the main conclusions I am forced to may appear startling and I do not put them forward other than as part of certain working hypotheses which have in their favour a number of important ethnological facts, some of which have been enumerated whilst others will be mentioned later. It will however be convenient if before doing so, I outline the hypotheses which I wish to put forward. Stated in as few words as possible, I believe the evidence of boat design in India, taken together with that of several peculiar methods of fishing practised in certain Indian localities and reinforced by various philological and ethnological data already known, lead us to the following conclusions, viz. :—

(a) The Pre-Dravidian coast population of Southern India was composed of varying blends of Negrito and proto-Polynesian stocks, the former the earlier. The former appear to have contributed a considerable portion of the round-headed element in the very dark races in hill and forest tracts.

(b) The Polynesian section of the pre-Dravidian coastal population of India is responsible for the introduction of the single outrigger form of canoes and boats, which in Polynesia of the present day is the characteristic and predominant type of boat-design.

(c) From the universality of the double outrigger design among Malaysians (Indonesians) and its absence among the outrigger-using races of Polynesia, Papuasia and Australia, save exceptionally on those shores turned towards Malaysia, I judge the double outrigger to be of Malaysian invention.

(d) The fact that the outrigger canoes of Madagascar and East Africa are typically of the double form, and that the design of the float attachment is of a very peculiar type, such as is elsewhere confined strictly at the present day to the northern coast of Java, make it appear probable that the colonists of Madagascar who introduced this double form of outrigger came from this particular region in Malaysia.

(e) A Malaysian wave of immigration *via* Ceylon appears to have followed the Polynesian at a much later date, and after the advent of the Dravidians, bringing coconut cultivation from the Malay Archipelago. The Shanars and Izhuvans (toddy-tappers) of South India probably date their ancestry to these immigrants.

(f) That the true Dravidians belong to the Mediterranean race.¹

(g) That the Dravidians acquired many customs now considered typical of the Mediterranean race while in the undivided race state, e.g. certain river boat forms and particularly the quarter rudder; also probably the use of the conch shell, though this is common also to the Papuan and Polynesian peoples.

(h) That before splitting off from the original stock, those of the Dravidians living in Mesopotamia borrowed or invented the circular coracle, and the reed raft.

(i) That some large portion of the race was subsequently forced by circumstances, possibly the pressure of some Alpine or Mongoloid race from the north-west (Akkads) or of Semitic people from the south or south-west, to pass eastwards, the Brahui language marking their presence at one time in Baluchistan.

(j) That on arrival in India from Baluchistan, they spread along the valleys of the Indus and the Ganges, introducing the boat forms of the Nile and the Tigris as they went, the former on the large perennial rivers, the latter on those which carry little water in the dry season.

(k) The Dravidians being inland or rather river people were clever irrigation agriculturists; to them it seems clear that we owe the eminence that India has had in this art throughout the historic period.

(l) Being river people, the early Dravidians would be glad to press the Polynesian sea-fishermen into their service, and to learn this art from them.

(m) The Polynesian element seems to have been entirely absorbed politically and linguistically by the Dravidians, a result explicable by the fewness of their numbers, their scattered condition, and their greater plasticity due to their hybrid origin (? Caucasian × Mongolian × Papuan).

THE TYPES AND DISTRIBUTION OF THE OUTRIGGER CANOE DESIGN.

A recent extensive tour through Malaysia and the western fringe of Papuasia, has enabled me to survey critically the extent and variation in form and detail shown by the outrigger boat design in this extensive region. Such a survey so far as I know has never before been adequately carried out; I hope shortly to describe the results attained, but for present purposes it will suffice if I state the outstanding conclusions

¹ This particular deduction is not original; Mr. F. J. Richards, I.C.S., has recently marshalled many arguments and facts in its favour. For these the reader is referred to his paper in last year's *Proceedings of the Mythic Society of Bangalore*.

based upon my own work in this region, reinforced by that of Alexander on South Sea types, of Haddon on those of Torres Straits and Australia, and by the references to this subject found in the literature of Pacific and Australasian travel.

Outrigger boats are divisible into two classes:

A.—*Double outriggers*, i.e. those having an outrigger float boomed out on each side, and

B.—*Single outriggers*; those with an outrigger float on one side only.

Both these main divisions are again subdivided according as they have (a) one or two, or (b) multiple (three or more) transverse poles (booms) connecting the boat or dug-out with the outrigger float. A further distinction is concerned with whether the boom be attached (I) directly thereto, or (II) indirectly by means of an intermediate joint which may consist of a variety of devices amongst which the most noteworthy are (1) straight sticks or stanchions, (2) obliquely placed rods, straight or curved, (3) U, Y, and O-shaped pieces, and (4) spliced elbow intermediaries.

Plotting the distribution of these varieties upon a chart of the world, we find that single outriggers with a small number of booms are characteristic of two distinct and widely severed regions. The first comprises India, Ceylon, the Maldives, the Nicobars and the western coast of Sumatra (Mentawai Islands); the second, the whole of Polynesia, Micronesia and Papuasia excepting the extreme west of New Guinea.

Those with multiple booms are confined to Oceania, the north coast of Australia (east coast of N. Queensland), and the Andaman Islands, localities far apart racially and geographically.

The range of double outriggers like that of the 2-boomed single outriggers is split up into two far-severed regions, the more extensive comprising the whole of the Philippines, Celebes and Moluccas, together with their dependent islands, the western extremity of New Guinea, and, further south and west, the islands of Lombok, Bali, Madura and Java. (Timor and Timorlaut I have not visited). The lesser area of distribution comprises the isolated region of Madagascar and the Comoro Islands with an extension to East Africa where it is found on the coast between Dar-es-Salaam and Lamu. The finest double outrigger canoes are those of East Java, Bali, the Philippines and the Celebes, where the coast people are more intelligent and enterprising than those to the eastward; these have usually two booms on each side in the case of smaller boats with three in the larger. These are attached to the float either directly or by a strong elbow joint. The most primitive appear to be the multiple-boomed outriggers of Western New Guinea, where as many as ten cross poles are employed, attached by upright stanchions to a soft wood float on either side. The Papuan (Papua + Melanesia) type of single outrigger which includes also that of Tonga, Fiji, and Samoa, is almost always of the stanchion type, whereas the true Polynesian, meaning thereby the northern and eastern sections of Polynesia, has either direct or bracket connection between the booms and the float. Direct connection is also the characteristic of the single outriggers of India and Ceylon.

If we consider the Negritoës and the Oceanic Negroes (Papuasiëns) to have been the first inhabitants of Malaysia and Papuasia, and the proto-Polynesians as the next

comers, forming the present Polynesian race by crossing with the higher elements of the Papuasians and both races using single outriggers, we can readily understand the peripheral distribution of this type of boat by the hypothesis, accepted fairly generally, that a Mongoloid race, the proto-Malays, spread fan-like from the Indo-Chinese peninsula among the islands inhabited till then by Negritoës, Oceanic Negroes and proto-Polynesians. This Mongoloid stock eventually partly drove out and partly absorbed these races over much of the region now known as Malaysia or Indonesia and for certain reasons developed the double outrigger as their type of small sea-craft. Some of these Malaysians as we may term them, seem to have passed to Madagascar at a very early date, carrying the double outrigger with them; thence the Arabs appear to have introduced it into East Africa. At the present time the Malays of the northern and eastern coasts of Sumatra and of the Peninsula have discarded the use of outrigger canoes; this is a comparatively recent alteration in sea-custom for at the latter end of the 17th century (1688) we find Dampier describing the construction of a double outrigger canoe by Achinese sailors. The influence exerted by constant intercourse with Western races upon an enterprising people ready to learn, has wrought this change.

NEGRITO, AUSTRALIAN AND PAPUASIAN AFFINITIES.

The fundamental similarities between the Andamanese type and a certain Australian form of single outrigger fitted with multiple booms have already been discussed, and the conclusion formulated that the Negritoës are to be credited with the invention of this particular type, subsequently borrowed by certain Australians. As we have Negrito races in the Malay Peninsula (Semangs, etc.) and in the Philippines (Aetas), and as there is distinct evidence of their blood being present in New Guinea as well as in Melanesia, while their descendants are numerous in Africa, it is reasonable to conclude that originally they extended from Africa, throughout India and the Indo-Chinese Peninsula, and to all the islands within easy reach of these coasts—from the Andamans on the West to New Caledonia in the East. Their presence in so many islands connotes some skill in sea-craft, and therefore I do not consider it unreasonable to postulate them as the originators of that form of outrigger canoe found in the Andamans, and on the east coast of Northern Queensland. So far as is known the Andamanese Negritoës held no communication with strangers prior to our occupation of the islands, and history shows that they have been consistently hostile to all persons visiting their islands. Another peculiarity which has had as much to do with the isolation of these islanders as their hostility to strangers, is the absence of the coconut palm from the archipelago with the exception of the Cocos Islands. As they are considered to be of pure Negrito blood, and so represent probably the most ancient of the distinct human races now surviving, it is difficult to conceive of their adopting a boat-form from any other race, particularly in view of their inveterate aversion to hold any dealings with other races. What they have, must be of their own invention, hence my conclusion that they are the inventors of that particular type of outrigger in use in their islands.

The route by which the ancestors of the Australian aborigines reached Australia is still unknown; their origin and relationships remain among the most difficult anthropological puzzles awaiting solution. Some connection with India has always appeared probable. India lies in the direct pathway of race movements from West to East, and various facts have been adduced in favour of proto-Australians having once inhabited India; among the chief of these has been the existence in South India of a form of curved throwing-stick akin to the Australian boomerang. Curved throwing-sticks were also used by the ancient Egyptians in the chase. A somewhat similar case is that of one form of Australian sea-raft which may be of common origin with the catamarans in use on the Coromandel coast of India. The latter craft are highly specialized and removed entirely from the category of simple rafts which are devices common to all races; similarly some of the Australian "sea-rafts" show enough specialization to make them worthy of inclusion in the same class as the Indian catamaran. In considering this problem and bearing in mind the Caucasian affinities of the Australian aborigines, the presence of sea-going sailing rafts on the Formosan coast has some significance for there is evidence of a Caucasian race having inhabited south-east Asia in pre-Mongol times; traces of these people are found in Cambodia and as there can be no question of the Ainu of Japan being of Caucasian descent, we may well credit Formosa with having been colonized by a branch of this same race. Hence it may well be that the *shaped raft* or catamaran is due to the inventiveness of an ancient and far-wandered branch of the Caucasian or so-called white race.

The traces of Papuan influence upon India are faint and in most cases are due to cultural drift rather than to the settlement of any of the race in India. An example of the former is probably the common use of the betel leaf in chewing, this being accounted by Prain¹ as of Papuan origin. More direct seems to be the connection evidenced by the close similarity in the form and decoration of canoes and the method of outrigger attachment between the canoes of the Nicobar islanders and those of many Papuans. As already described, the Nicobar outrigger canoes have peculiarly high and attenuated prows, and are of the single type, with two booms, each attached to the float by means of a complex arrangement of three pairs of oblique stanchions. A strong Malay element exists in the Nicobarese but strangely enough the form of the hull, the single type of outrigger frame, and the method of float and boom attachment are all foreign to the Malaysian or Indonesian types. Their nearest relationship is with the high-prowed single outriggers of New Guinea and with Fijian outriggers. At Manokwari in Geelvink Bay (N. Guinea) I have seen many canoes with high prows that suggest similarity in origin, while in Humboldt's Bay all the local outriggers have a mode of outrigger attachment almost identical with the Nicobar pattern, differing only in there being two pairs of oblique stanchions instead of three pairs.

Of interest here are the facts recorded by Boden Kloss² that occasionally

¹ Prain, Sir D., *Man*, 1917, No. 77.

² *Loc. cit.*, pp. 227 and 225.

" besides the aquiline noses already mentioned, a distinctly Jewish or Papuan feature is met with," that the skin of these people is far darker than is usual among Malays and the hair occasionally curly—all suggestive of the presence of a strain of Papuasian blood.

THE POLYNESIAN ELEMENT IN INDIA.

Prior to the incoming of the Dravidians into Southern India it seems probable that a coastal immigration and settlement of Polynesians occurred. From the geographical distribution of outrigger canoes and of brachycephalic coast people, it is probable that these Polynesians crossed from Sumatra. It is significant that at the present day an isolated remnant of a race having strongly marked Polynesian characteristics inhabits the Mentawai Islands off the *west* coast of Sumatra. Rosenberg¹ describes them as resembling in many points the natives of the Marquesas Islands—a fine-looking gentle race who deck the head and the ears with flowers in the Polynesian fashion. Their cast of features is far less Mongol-like than their Malay and Battak neighbours, and, more striking still, their hair is often very curly. A point of the highest importance in this connection is the fact that in common with Polynesians, they employ a single outrigger on their canoes, in striking contrast to the double form so characteristic of Malaysian small craft. The Sumatran Polynesians would naturally land first in Ceylon, whence they appear to have passed to the south-eastern coast of India, and eventually up the West Coast. As they spread they doubtless planted fishing colonies at favourable points, establishing there their peculiar boat designs. Such centres may well have included Galle, Colombo, and Korkai, where the embouchure of large rivers makes fishing remunerative. Palk Bay and the Gulf of Mannar, with their wealth of food fishes and treasures of pearls and chank shells, would early attract the attention of the maritime newcomers, and, it is not surprising that there we find the Polynesian boat forms in great variety, and, in common with peculiar Polynesian fishing devices, in continued high esteem by the local fishermen and divers. These people appear also to have freely settled upon the West Coast looking to the great value still set upon the outrigger on the Bombay coast.

The Maldiv islands were probably peopled by Polynesian immigrants at a very early period—much earlier, I believe, than is generally supposed, for we find the Maldivians employing fishing methods nowhere else in use except in Papuasia and the Pacific. Of these the two most important are (*a*) the luring of sword-fish and other great predaceous fish within easy spearing distance by means of a rude wooden representation of a flying fish dangled from the end of a short rod,² and (*b*) the methods employed in the attracting, catching and curing of bonito, which are almost identical as carried on by the Maldivians and the Japanese, in the latter of whom a strong Polynesian strain probably exists in the higher or governing classes. The Laccadive

¹ Rosenberg, H. von, *Int. Archiv. f. Ethnogr.*, I. 1888.

² Dampier's Account of New Holland and the adjacent Islands in Pinkerton's "Voyages" and Hornell in *Madras Fisheries Bulletin*, No. 4, p. 114.

Islanders also employ the former fishing method, but being of different racial origin, they appear to have borrowed it from the Maldivians *via* Minicoy.

The balance-board using fishermen in Palk Bay employ also a method of fishing small Octopus for bait which likewise is found in the Pacific—the sinking overnight of large numbers of shells tied at short intervals along a long rope. In Japan the refinement of employing small narrow-necked earthenware jars instead of shells is practised.

I am inclined to think that the migration of these Polynesians passed on at some indeterminate period from South India and the Maldives to Madagascar, for a good many of the Malagasy tribes older than the Hova (the Hova being by tradition the latest arrived of the various Malagasy-speaking waves of immigration that have successively broken upon the shores of this island), according to Sir H. H. Johnston, bear a strong facial resemblance not to the Mongoloid Malay, but to the true Polynesians of the present day.

As this paper is not intended to do more than to put forward certain hypotheses, and the limited evidence in favour of such shown by the survival of peculiar boat forms in India, I cannot take up satisfactorily the anthropological aspect of the problems involved; indeed without an extensive anthropometric survey of the fishing communities of our coasts such an attempt would now be folly. It is unfortunate that Mr. Thurston's investigations from this standpoint did not include sufficient examples from the coastal areas in India where Polynesian boat designs persist—hence no data are at present available to check my Polynesian hypothesis with the exception of the measurements which I have taken recently relating chiefly to the Parawa fisher caste of the Tinnevelly coast given below. The subject is a greatly involved one, for we have to face the fact that the Austric-speaking peoples are very heterogeneous anthropologically though fairly homogeneous linguistically.

The presumption is however that this strain, if it existed, was brachycephalic and the fact that the Tulu, Canarese, and Marathi-speaking peoples include a large proportion of round skulls, whereas the Malayalis of Malabar are typically long-headed, is decidedly in favour of my main contention, as one of the clearest facts brought out in my survey of boat designs is that the Konkan and the Kanarese coast inhabited by the comparatively broad-headed Marathas, Canarese, and Tulus are distinguished by strong adherence to the outrigger design, whereas on the Malabar coast, occupied by the long-headed Malayalis of Dravidian race, this form of boat is singularly conspicuous by its absence.

Thus Thurston¹ in a table of the head measurements of representative classes in the areas in question, gives the following:—

Three classes of Marathas as having cranial indices of 82·2, 81·8, and 79·8 respectively; of five classes of Canarese-speaking people as 81·7, 78·5, 77·8, 77·6 and 77·3; of two Tulu-speaking classes as 80·1 and 78·0 respectively (Billavas and Bants), while of three classes of Malayalis, the average indices were as low as 75·1, 74·4 and

¹ *Castes and Tribes of South India*, Vol. I, p. xxxviii.

73°. The broadest headed of these Malayalis were of the Mukkuvan or fisher caste (75°), a point of some importance as it indicates possible admixture with some broader-headed race.

Very striking and pertinent are the data I recently obtained upon the cranial index of the Parawa fishermen of the Tinnevelly coast. So far as I know no anthropometric measurements of this caste have hitherto been published, and it has been inferred that they agreed in long-headedness with the overwhelming majority of Tamil-speaking people to the northward whereto Mr. Thurston's investigations were chiefly directed. My investigation shows this conclusion to be entirely erroneous and proves them to be distinctly brachycephalic on the average of the first 50 measured. (For details see tabulations appended). Of these as many as 24 had a cranial index of 80 and over, whilst the average was 79·4; the maximum was, however, as high as 92·5, the minimum being 70·9. These Parawas are often tall and well-made men, of muscularity distinctly greater than the ordinary Tamil ryot engaged in rice and cotton cultivation. (Pl. I, fig. 1).

The roundheadedness of Marathas and other races in the Bombay Presidency has been referred by Risley to a strong strain of Scythic or Hun blood in these people; even assuming this to be so, a hypothesis denied by Crooke¹ and others, a similar explanation is impossible in the case of the Tinnevelly caste above cited, as there has never been any suggestion of Scythic invasion of the extreme south of the Peninsula. I incline to think that these Parawas represent a part of that fierce Naga race described by ancient Tamil writers as in possession of the coast districts and with Negapatam as their chief town when the Tamils first arrived in the south.² If so, I would then identify the Nagas with an ancient coastal people of Polynesian affinity.

In this connection, are notable the frequent allusions in early Tamil poems³ to voyages made by merchants and others to Nagapuram in "Chavakam" whereby Sumatra and Java are known in the Tamil classics. To-day Negapatam (Negapattanam), "the city of the Nagas," is the nearest port on the Tamil coast to Sumatra; it conserves the tradition of long trade relation with the Straits and China; its harbour still forms the southern gate to India from the East. The legend of Asoka's naval punitive expedition against the Naga pirates who had plundered Indian ships has already been referred to (p. 213).

A point of great importance is the current traditional belief among the Parawas themselves, that they are incomers in the parts they now inhabit and not of indigenous stock. They claim high descent and boast of being allied to the lunar race; they believe that their original country was Ayodhya or Oudh and that previous to the war of the Mahabharata they inhabited the territory bordering on the river Jumna. One of their legends⁴ states that at the close of the last *kalpa*, when the whole earth was covered with a deluge, they constructed a dhoni or boat, and by it escaped the general destruction; when dry land appeared they settled on the spot where the dhoni rested.

¹ Crooke, W., *Man*, 1917, 91.

² Kanakasabai Pillai, *loc. cit.*

³ Kanakasabai Pillai, *The Tamils Eighteen Hundred Years Ago*, Madras.

⁴ Thurston, E., *Castes and Tribes of South India*, vi, p. 141.

Thurston adds: "The Parawas were once a powerful people and no doubt derived much of their ascendancy over other tribes from their knowledge of navigation. They had a succession of kings among them, distinguished by the title of Adiyarāsen, some of whom seem to have resided at Uttara Kōsamangay in the neighbourhood of Ramnad."

The fables concerning their northern origin appear to have no foundation in fact, but they do have value as corroboration of the theory that they are of different race to the mass of the population of South India. Further evidence in favour of this belief that the ancestors of the Parawas were immigrants from a distant land whence they must have come in boats, looking to their occupational calling, is contained in the report to the Governor of Ceylon and Dutch India, dated December 1669, by two Dutch officials, Van Reede and Laurens Pyl,¹ who wrote:—

"Under the protection of those Rajas there lived a people, *which had come to these parts from other countries*—they are called Parruas—they lived a sea-faring life, gaining their bread by fishing, and by diving for pearls; they had purchased from the petty Rajas small streaks of the shore, along which they settled and built villages, and they divided themselves as their numbers progressively increased.

"In these purchased lands they lived under the rule of their own headmen, paying to the Rajas only an annual present, free from all other taxes which bore upon the natives so heavily, *looked upon as strangers*, exempt from tribute or subjection to the Rajas, having a chief of their own election, whose descendants are still called Kings of the Parruas, and who drew a revenue from the whole people which in process of time has spread itself from Quilon to Bengal.² Their importance and power have not been reduced by this dispersion, for they are seen at every pearl fishery (on which occasions the Parruas assemble together), surpassing in distinction, dignity and outward honours, all other persons there, and still bearing their own appellation.

"The pearl fishery was the principal resource and expedient from which the Parruas obtained a livelihood, but as from their residence so near the sea, they had no manner of disposing of their pearls, they made an agreement with the Rajas that a market day should be proclaimed throughout their dominions, when merchants might securely come from all parts of India, and at which the divers and sutlers necessary to furnish provisions for the multitude might also meet, and as this assemblage would consist of two different races, namely the Parruas and subjects of the Rajas, as well as strangers and travellers, two kinds of guards and tribunals were to be established to prevent all disputes and quarrels arising during this open market, every man being subject to his own judge, and his case being decided by him; all payments were then also divided among the headmen of the Parruas, who were the owners of that fishery, and who hence became rich and powerful; they had weapons and soldiers of their own, with which they were able to defend themselves against the violence of the Rajas or their subjects."

¹ Hornell, J., *Report on the Indian Pearl Fisheries in the Gulf of Mannar*, Madras, 1905.

² Vangale, a village, a few miles south of Mannar, in Ceylon. (J. H.)

In considering the suggestion I make that a Polynesian immigration into India occurred prior to or soon after the arrival of the Dravidians, the fact should not be forgotten that the Malayo-Polynesian settlement of Madagascar antedated the spread of Hindu influence in the Malay Archipelago (in the early centuries of our era), for there are said to be no Sanskrit words in the Malagasy languages. To pass from Sumatra to Madagascar in numbers sufficient to settle a country and this not once but in several successive waves, is difficult to credit, but if we intercalate India with its dependency of the Maldivian Islands, the difficulty diminishes to reasonable dimensions. Against this Sir H. H. Johnston¹ has urged that they have left no traces of their passage, but this argument is, I think, invalidated now that I have shown how extensively Polynesian boat designs have survived on sections of the Indian coast line, taken in conjunction with the round-headedness of certain of the most numerically important castes in the same localities, which I have recently discovered.

I append tabulated measurements of men belonging to four of the principal castes in Tinnevelly,—Vellalar, Parawar, Shanar and Paraiyar,—from which it will be seen that the three latter which are sub-brachycephalic, agree very closely in the average cranial index, whereas the Vellalas approach much more closely to the index accepted by Thurston and others as representing the typical Dravidian. I also give measurements of a number of men from the Tanjore coast. Comparison of the latter with the former shows these representatives of the Tanjore population to contain much less of the round-headed strain. The Vellalas of the two districts evidently have the same ethnic origin; the sub-brachycephalic Parawas of the Tinnevelly coast, a caste not found in Tanjore, are possibly represented there by Ahambadians and coast Muhammadans or Labbais (both occupied with fishing and fish-curing at the places visited) with indices respectively of 79·9 and 80·1. Conversely the Sembadavar fishermen of Adirampatam are distinctly sub-dolicocephalic with an index of 76·03. These men, however, are not usually deep-sea fishermen; they are the principal users of the casting net and fish chiefly in rivers and backwaters, a fact which, when taken in conjunction with the shape of their heads, points to a Dravidian origin with its concomitant of fishing customs derived from the Tigris, Euphrates and Nile.

The Shanars present several very curious divergences from the other castes named. In Tinnevelly district they form a very important section of the population; their occupational calling is Palmyra palm cultivation; in Travancore their kinsmen, the Izhuvans, cultivate the coconut. As will be seen from the tables appended, the cranial index of the 100 individuals measured was 80·7; the maximum was 90·3, the minimum 71; as many as 60 were 80 and over. They are decidedly broader headed than the Parawas; more stoutly built than the latter, frequently short and thick-set, with an entirely different caste of features to the typical Parawar type. Among the latter curly hair is not uncommon; among the Shanars the hair of the head is coarse, black, and straight. In features considerable variation is seen; one well-marked type can, however, be made out as predominant. In this the

¹ *Living Races of Mankind*, Vol. II, p. 420.

face is wide and short, the nose short, moderately small, and depressed very often at the root. No prominent eye-ridges; the lips moderately thick. The general impression given by the features is that of heaviness.

To anyone familiar with the heavy-featured Malaysian people of Java and the southern Celebes, the approximation of many of these Shanars to the same general type is very striking. Several indications point to a common origin. (a) The coconut is not a native of India; it reached that country by way of Ceylon and the Malay Archipelago; hence we may infer that the people who live by its cultivation most probably accompanied it from the same region. Local tradition supports this, for the Izhuvans are said to be descendants of Shanar colonists from Ceylon who brought the coconut palm with them.¹ (b) The Ceylon and the Indian outriggers differ considerably and these differences may quite likely be correlated with separate waves of immigrants from Malaysia—the first Polynesian, the second Malaysian. In Madagascar we have distinct evidence of several waves of Malayo-Polynesian immigration; if India and Ceylon were half-way stations between Sumatra and Madagascar as we have reason to believe, from the facts I have adduced in regard to the outrigger design of canoe, evidence of two Malayo-Polynesian waves having broken on the shores of South India is precisely what we should expect.

But it is vain labour to attempt to go further in the elaboration of the hypotheses stated above, pending the accumulation of much more definite and detailed information regarding the physical characteristics, customs, habits and superstitions of coastal communities on the sea-board of India and of the surviving Munda-speaking races for correlation and comparison with corresponding data relating to the peoples of Malaysia, Polynesia and Papuasia respectively.

MEASUREMENTS OF 50 MEN OF THE PARAWAR CASTE. TINNEVELLY DISTRICT.

No.	Height.	SKULL.			NOSE.		
		Length.	Breadth.	Cr. Index.	Length.	Breadth.	Index.
	Ft. Ins.	Cms.	Cms.		Cms.	Cms.	
1	5 2 $\frac{1}{2}$	18.3	15	81.96	5.2	3.8	73.07
2	5 7 $\frac{1}{2}$	20.7	15.1	72.94	5.6	3.5	62.5
3	5 8 $\frac{1}{2}$	17.3	14.9	86.12	5.3	3.5	66.03
4	5 3 $\frac{1}{2}$	18.8	14.6	77.65	5.1	4.4	86.27
5	5 9 $\frac{1}{2}$	18.6	15	80.64	4.9	4.2	85.71
6	5 4 $\frac{1}{2}$	19	15.2	80	6	4.7	68.33

¹ *The Cochin Tribes and Castes*, by L. K. Anantha Krishna Iyer, Vol. I, p. 277. Madras, 1909.

No.	Height.	SKULL.			NOSE.		
		Length.	Breadth.	Cr. Index.	Length.	Breadth.	Index.
	Ft Ins.	Cms.	Cms.		Cms.	Cms.	
7	5 0 $\frac{1}{2}$	18.7	14.4	77	5.7	3.5	61.40
8	5 2	17.7	14.5	81.92	4.1	3.9	95.12
9	5 8 $\frac{1}{2}$	16	14.8	92.5	..	..	..
10	5 8 $\frac{1}{2}$	18.7	15	80.21	..	..	..
11	5 4 $\frac{1}{2}$	18.5	16.3	88.10	5.1	4	78.43
12	5 3 $\frac{1}{2}$	19.2	14.5	75.52	5.4	4	74.07
13	5 0	18.3	14.7	80.32	4.6	4	86.95
14	5 8 $\frac{1}{2}$	20.7	14.8	71.49	5.6	3.7	66.07
15	5 2 $\frac{1}{2}$	19.8	15	75.75	5	3.8	76
16	4 8 $\frac{1}{2}$	19.3	14.2	73.57	5.7	4.1	71.92
17	5 5 $\frac{1}{2}$	19	15.2	80	4.8	3.9	81.25
18	5 1	17.5	15	85.71	5.2	4	76.92
19	5 3 $\frac{1}{2}$	20	15	75	4.6	3.8	82.60
20	6 0 $\frac{1}{2}$	20	14.8	74	4.5	3.6	80
21	5 5	18.5	14.6	78.91	5.2	4.6	88.46
22	5 5 $\frac{1}{2}$	18	15	83.33	5.5	4.6	83.63
23	5 5 $\frac{1}{2}$	18.7	15.5	82.94	5.1	4.2	82.35
24	5 5 $\frac{1}{2}$	19.3	15.5	80.31	5.6	3.8	67.85
25	5 6 $\frac{1}{2}$	19.7	15.2	77.15	5.4	3.9	72.22
26	4 11 $\frac{1}{2}$	18.5	15	81.08	4.8	3.8	79.16
27	5 3 $\frac{1}{2}$	18.1	14.7	81.21	4.9	3.5	71.42
28	5 5 $\frac{1}{2}$	18.4	15.3	83.15	5.4	3.8	70.37
29	5 0 $\frac{1}{2}$	18.5	15.2	82.16	4.4	3.5	79.54
30	5 2	18.6	15.6	83.87	5.2	4.1	78.84
31	5 0 $\frac{1}{2}$	18.5	14.7	79.45	5.2	4	76.92
32	5 5 $\frac{1}{2}$	18.9	14.5	76.71	4.8	4.3	89.58
33	5 1 $\frac{1}{2}$	19	15	78.94	5.5	3.8	69.09

No.	Height.	SKULL.			NOSE.		
		Length. Ft. Ins.	Breadth. Cms.	Cr. Index.	Length. Cms.	Breadth. Cms.	Index
34	5 4	19.9	14.1	70.85	4.7	3.9	82.97
35	5 8½	18.8	15	79.78	4.7	4.3	91.48
36	5 3½	19.7	14.4	73.09	5.7	4.3	75.43
37	5 4	18.9	14.6	77.24	4.4	3.9	88.63
38	5 4	19.5	14.4	73.84	5.1	3.9	76.47
39	5 5½	18.6	14.3	76.88	4.6	4.1	89.13
40	5 6	18.4	14.3	77.71	5.1	3.8	74.50
41	5 3	19.7	14.7	74.61	5.6	4.2	75
42	5 4	19.3	14.3	74.09	4.8	4.2	87.5
43	5 1	17.2	13.8	80.23	5	4.1	82
44	5 5½	18.9	16.4	86.77	5	4	80
45	5 9½	19.2	15.2	79.16	6	4.2	70
46	5 6½	18.6	15.5	83.33	5.6	3.6	64.28
47	5 4	18.2	15	82.41	4.3	4	93.02
48	5 6½	18.6	14.5	77.95	6.1	4	65.57
49	5 1½	18.4	14.8	80.43	4.9	3.6	73.46
50	5 7½	17.7	14.4	81.35	4.8	3.8	79.16

Average 5' 4.44"

79.39

77.72

Cranial index :—

Maximum ..

Minimum ..

Average ..

Nasal index :—

Maximum ..

Minimum ..

Average ..

.. 95.12

.. 61.40

.. 77.72

The highest cranial index was correlated with a height of 5 ft. 8½ in.; the tallest man (No. 20) was 6 ft. 0½ in., with a cranial index of 74.00 and nasal index of 80. The second lowest nasal index of 62.5 (No. 2) was associated with a distinctly dolichocephalic head. Eight men were over 5 ft. 8 in. in height.

HEAD MEASUREMENTS OF 100 SHANARS. TINNEVELLY DISTRICT.

No.	SKULL.			NOSE.		
	Length. Cms.	Breadth. Cms.	Cr. Index.	Length. Cms.	Breadth. Cms.	Index.
1	18.3	14.9	81.42	5.4	3.5	64.81
2	18.2	14.2	78.02	4.9	3.6	73.46
3	18.1	14.9	82.32	5.1	3.9	76.47
4	17.2	14.9	86.62	4.6	3.6	78.26
5	18.9	14.5	76.71	5.3	2.8	52.83
6	17.9	14.7	82.12	4.9	3.2	65.3
7	18.8	14.3	76.06	4.9	3.8	77.55
8	18.7	15.3	81.81	5.2	3.5	67.3
9	19.3	16	82.9	6.1	4.2	68.85
10	18.7	14.8	79.14	4.7	3.6	76.59
11	17.4	14.6	83.9	5.4	3.7	68.51
12	18.3	14.3	78.14	5.1	3.6	70.58
13	18.5	14.8	80	5.2	3.4	65.38
14	17.6	15.1	85.79	5.5	3.3	60
15	17.7	14.9	84.18	5	3.5	70
16	18.5	15.2	82.16	5.2	3.6	69.23
17	17.5	14.5	82.85	4.6	3.6	78.26
18	17.6	15.3	86.93	5.3	3.6	67.92
19	18.1	15.3	84.53	4.8	3.7	77.08
20	18.5	15.6	84.32	5.6	3.7	66.07
21	19.5	14.6	78.46	5.7	3.8	66.66
22	19	15.6	82.1	4.7	4.1	87.23
23	17.2	14	81.39	4.7	3.9	82.97
24	19.3	13.8	71.5	5.2	3.8	73.07
25	18.7	14.8	79.14	4.8	3.8	79.16
26	19.1	15.4	80.62	5.9	4	67.79

No.	SKULL.			NOSE.		
	Length.	Breadth.	Cr. Index.	Length.	Breadth.	Index.
	Cms.	Cms.		Cms.	Cms.	
27	18·8	14·9	79·26	4·9	3·8	77·55
28	17·6	14·4	81·81	5·1	3·8	74·50
29	19·3	13·7	70·98	5·8	3·9	67·24
30	17·6	14·4	81·81	5·1	3·2	62·74
31	18·5	14·6	78·91	4·7	3·3	70·21
32	19·4	14·8	76·28	5·1	3·6	70·58
33	17·9	13·9	77·65	4·6	3·6	78·26
34	19·1	14·8	77·48	5·1	4	78·43
35	16·7	14·9	89·22	4·9	3·5	71·42
36	18·8	14·2	75·53	4·8	3·2	66·66
37	17·6	15	85·22	4·7	3·4	72·34
38	17·3	14	80·92	4·7	3·3	70·21
39	18·6	13·7	73·65	4·7	3·6	76·59
40	18·2	14·3	78·57	4	3·6	90
41	18·7	14·5	75·93	4·3	3·8	88·37
42	18·2	15·3	84·06	5·4	4·1	75·92
43	17·9	14·6	81·56	4	3·1	77·5
44	17·5	14·6	83·42	3·9	3·7	94·87
45	18	14·5	80·55	4·2	3·7	88·09
46	18·3	16	87·43	5·8	4·1	70·68
47	17·6	14	79·54	4·8	3·5	72·91
48	18	16·2	90	5·1	3·5	68·62
49	17·8	14·1	79·21	3·8	3·1	81·57
50	17·5	14·6	83·42	4·8	3·5	72·91
51	18	15·5	86·11	4·3	3·4	79·06
52	17·5	15	85·71	4·2	3·3	78·57
53	18·5	13·6	73·51	4·1	3·6	87·8

No.	SKULL.			Nose.		
	Length. Cms.	Breadth. Cms.	Cr. Index.	Length. Cms.	Breadth. Cms.	Index.
54	17·4	14·1	81·04	4·4	3·1	70·45
55	17·5	14·4	82·28	5	3·1	62
56	17·8	14·5	81·46	4·4	3·3	75
57	18·4	15	81·52	5·4	3·6	66·66
58	18·7	14·5	75·93	5	3·9	78
59	18·5	14·6	78·91	4·8	3·5	72·91
60	18	14·5	80·55	5·3	3·8	71·69
61	18·4	14·4	78·26	4·2	3·5	83·33
62	17·5	14	80	4·5	3·6	80
63	17·5	14·7	84	4·2	3·3	78·57
64	18	14·9	82·77	4·2	3·2	76·18
65	18·8	14·6	77·65	4·7	3·6	76·69
66	17·4	14	80·45	4·2	3·2	76·18
67	17·7	13·8	77·96	5·3	3·5	66·03
68	18·3	14·3	78·14	4·6	3·3	71·73
69	18·8	14·6	77·65	4·6	3·4	73·69
70	17·7	15·3	86·44	4·9	3·4	69·38
71	18·4	14·7	79·89	5·4	3·6	66·66
72	18	14·8	82·22	4·2	3·7	88·09
73	18·6	14·5	77·95	5	3·2	64
74	18·9	14·5	76·71	4·5	3·4	75·55
75	19·5	14·4	73·84	4·1	3·3	80·48
76	19·2	14·3	74·47	5·2	3·7	71·15
77	19·1	14·6	76·43	4·4	3·9	88·63
78	18·1	14·6	80·66	4·8	3·8	79·16
79	18·7	14·4	77·00	4·3	3·9	90·69
80	17·5	14·4	82·28	4·7	3·2	70·21

No.	SKULL.			Nose.		
	Length. Cms.	Breadth. Cms.	Cr. Index.	Length. Cms.	Breadth. Cms.	Index.
81	17.2	14.4	83.72	4.7	3.2	68.08
82	17.4	14.2	81.60	4.6	3.2	69.56
83	17.5	14.5	82.85	4.8	3.5	72.91
84	18.2	15	82.41	4.7	3.4	72.34
85	18.5	15.4	83.24	4.7	4	85.10
86	19.2	15.3	79.68	4.4	3.6	81.81
87	18.8	15	79.78	4.4	4	90.90
88	17.9	14.9	83.24	4.6	4.3	93.47
89	18.7	13.7	73.26	4.1	3.3	80.48
90	16.5	14.9	90.30	4.3	3.2	74.41
91	17.6	14.7	83.52	4.8	3.6	75
92	17.8	14.7	82.58	4.1	3.1	75.60
93	17.3	14.6	84.39	4.8	3.7	77.08
94	18.1	14.5	80.11	4.8	3.8	79.16
95	18.2	15.1	82.96	5.2	3.4	65.38
96	18	14.6	81.11	4.7	3.7	78.72
97	18.3	14.3	78.14	5.1	3.4	66.66
98	17.6	14.4	81.81	5.1	3.3	64.70
99	18.2	14.2	78.02	5.4	3.3	61.11
100	18.7	15.3	81.81	4.8	3.5	72.91
Average	..	..	80.72	..	..	74.43
Maximum	..	..	90.30	..	..	94.87
Minimum	..	..	73.26	..	..	52.83

MEASUREMENTS OF 31 PARAYANS. TUTICORIN.

No.	Height.	SKULL.			NOSE.		
		Length.	Breadth.	Cr. Index.	Length.	Breadth.	Index.
	Ft. Ins.	Cms.	Cms.		Cms.	Cms.	
1	5 2	17.3	14.3	82.65	4.3	3.6	83.72
2	5 4	17.4	14.4	82.75	5.3	3.8	71.69
3	5 5½	20.1	15.1	75.12	5.1	3.8	74.5
4	4 8	18.3	14.6	79.78	5	3.7	74
5	5 0	18	14.8	82.22	4.7	3.5	74.46
6	5 3½	18.4	15.1	82.06	4.9	3.9	79.59
7	5 5½	19.5	16.1	82.56	5	4	80
8	5 2	18.1	15	82.87	4.2	3.7	88.09
9	5 7	18.9	14.6	77.24	5.2	4.1	78.84
10	5 5½	18.6	15.4	82.79	4.4	3.8	86.36
11	5 5½	18.1	14.4	79.55	4.8	3.8	79.16
12	5 0½	18.1	14.7	81.21	4.7	3.7	78.72
13	5 5½	18.5	14.6	78.91	5	4	80
14	5 4½	18.4	14.7	79.89	5	3.8	76
15	5 2½	18.1	14.4	79.55	4.7	3.9	82.97
16	5 4¾	19	15.6	82.1	5	4.3	86
17	5 6½	18.6	15	80.64	5.2	4.2	80.76
18	5 8	17.9	14.4	80.44	5.6	3.3	58.92
19	4 11½	18.2	14.7	80.76	5.3	3.6	67.92
20	5 7½	18.5	14.4	77.83	5.1	3.7	72.54
21	5 3	18.1	14.9	82.32	4.7	3.8	80.85
22	5 3	18.4	13.9	75.54	5.1	4	78.43
23	5 3	18.2	14.4	79.12	4.7	3.6	76.59
24	5 5½	18.9	15.2	80.42	4.3	3.8	88.37
25	5 4	17.7	14.5	81.92	5	3.2	64.00
26	5 1½	18.2	14.1	77.47	5	4.0	80.00

No.	Height.	SKULL.			NOSE.		
		Length.	Breadth.	Cr. Index.	Length.	Breadth.	Index.
	Ft. Ins.	Cms.	Cms.		Cms.	Cms.	
27	5 2	18·8	15	79·78	4·7	3·9	82·97
28	5 2	18	14·1	78·33	4·4	3·5	79·54
29	5 1½	17·7	14·6	82·48	5	3·5	70
30	5 4	17·9	14·8	82·68	4·5	4·1	91·13
31	5 9½	18·2	14·5	79·67	5·1	3·5	68·62
Average 5' 3" 7				80·34			77·89
Maximum	..	..	..	.. 82·87	..	..	91·13
Minimum	..	..	..	.. 75·12	..	..	58·92

MEASUREMENTS OF 6 PILLAIS (VELLALA CASTE). TUTICORIN.

No.	Height.	SKULL.			NOSE.		
		Length.	Breadth.	Cr. Index.	Length.	Breadth.	Index.
	Ft. Ins.	Cms.	Cms.		Cms.	Cms.	
1	5 3	19·1	14·6	76·43	5·5	3·4	61·81
2	5 3½	18	14·1	78·33	5·1	3·9	76·47
3	.. ..	18·2	14·7	80·78	5·1	3·7	72·54
4	5 6½	19·6	15·2	77·55	5·4	3·5	64·81
5	5 4½	18	14·3	79·44	5·3	3·4	64·15
6	5 5½	20·1	15·1	75·12	5·9	4	67·79
Average 5' 4" 7				77·94			67·92

HEAD MEASUREMENTS OF 20 VELLALAS FROM THE COAST REGION OF
 TANJORE DISTRICT.

No.	SKULL..			REMARKS.
	Length. Cms.	Breadth. Cms.	Cranial Index.	
7 SAIVA VELLALAS.				
1	18·8	14·6	77·6	
2	18·7	13·9	74·3	
3	18	13·8	76·6	Cranial Index :—
4	19·5	15·8	81·0	Average 77
5	17·4	13·9	79·8	Maximum 81
6	19·2	13·5	70·5	Minimum 70·5
7	18·1	14·4	79·5	
4 PILLAIS (CANAL-BOAT CREW).				
1	18·7	14·5	77·4	
2	18·4	14·1	76·6	Average 74·9
3	19·7	14·0	71	Maximum 77·4
4	19·4	14·5	74·7	Minimum 71·0
9 KARATHURAI VELLALAS (FISHERMEN BY OCCUPATION).				
1	18·4	14·4	78·2	
2	19·9	14·8	74·3	These men are in reality Pattanavans—the true Tamil sea-fisher caste, but their appearance and cranial measurements bespeak a close racial connection with the higher caste Vellalas.
3	18·8	14·3	76·0	
4	19·5	13·5	69·2	
5	19·2	14·3	74·5	
6	19·7	14·8	75·1	
7	18·8	14·1	75	
8	18·5	13·6	73·5	
9	19·1	14·4	75·3	
Average for the whole		75·5		

Note.—It is significant that Tinnevelly Vellalas living in the midst of castes which are distinctly brachycephalic, are considerably higher in cranial index than those of Tanjore where the long-headed Dravidian type appears to be dominant.

HEAD MEASUREMENTS OF 23 MEN OF THE SEMBADAVAR CASTE, AT
ADIRAMPATAM (TANJORE DISTRICT).

No.	Length. Cms.	Breadth. Cms.	Cranial Index.	REMARKS.
1	19.9	14.4	72.3	
2	20	14.1	70.5	
3	18.8	14.6	77.6	
4	19.1	14.2	74.3	
5	19.0	14.9	78.4	
6	19.5	14.9	76.4	
7	19.5	14.5	74.3	
8	19.1	14.4	75.3	
9	20	15.5	77.5	
10	18	15	83.3	
11	19.1	15.1	79	
12	18.5	14.2	76.7	Average .. 76.03
13	19.1	14.1	73.8	Maximum .. 83.3
14	18.8	14.1	75	Minimum .. 70.5
15	19.0	14.5	76.3	
16	17.9	14.6	81.5	
17	19.3	13.9	72	
18	18.1	14.1	77.9	
19	20.4	15.6	76.4	
20	19.4	14.5	74.7	
21	18.6	14.4	77.4	
22	19.7	14.3	72.5	
23	19.6	14.8		

HEAD MEASUREMENTS OF 5 FISHERMEN OF THE AHAMBADIAR CASTE,
ADIRAMPATAM (TANJORE DISTRICT).

No.	Length.	Breadth.	Cranial Index.	REMARKS.
	Cms.	Cms.		
1	17.0	14.2	83.5	
2	18.4	14.6	79.3	Cranial Index:—
3	18.0	14.1	78.3	Average 79.9
4	19.6	15.7	80.1	Maximum 83.5
5	19.4	15.2	78.3	Minimum 78.3

HEAD MEASUREMENTS OF 4 FISHERMEN OF THE PATTANAVAR CASTE
(NEGAPATAM).

1	18.5	14.3	77.3	Average 75.8
2	18.2	14.0	76.9	Maximum 77.3
3	19.1	14.5	75.9	Minimum 73.1
4	19.7	14.4	73.1	

HEAD MEASUREMENTS OF 11 MUHAMMADANS, LABBAI CASTE,
TANJORE DISTRICT.

No.	Length.	Breadth.	Cranial Index.	REMARKS.
	Cms.	Cms.		
1	18.4	15.2	82.6	
2	18.5	15.0	81.0	
3	17.4	13.5	77.6	
4	18.3	14.9	81.4	
5	17.0	13.9	81.7	Average 80.1
6	18.5	14.5	78.9	Maximum 82.6
7	18.5	14.8	80.0	Minimum 73.8
8	19.5	14.4	73.8	
9	17.6	14.5	82.3	
10	18.1	14.6	80.6	
11	19	15.6	82.1	

APPENDIX.

The Significance of the Oculus in Boat Decoration.¹

By JAMES HORNEll.

Amongst some of the coast people of India to-day, ships and boats are endowed with more than inanimate attributes—in a vague way their crews look upon them as sentient; the remnants of ancient animistic beliefs make their craft or some portion of it the habitation of a protecting spirit requiring periodical propitiation; among communities containing men capable of higher thought, this vague feeling is sometimes refined and crystallized, a definite shrine is set up and a definite God there wor-

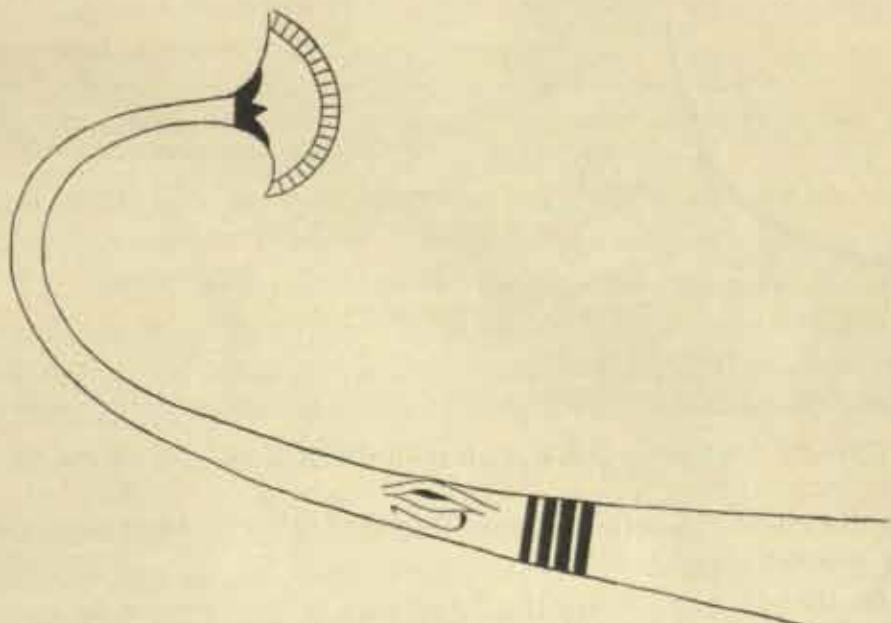


FIG. 30.—Prow of an Egyptian funeral barge, circa 1400 B.C. (after Maspéro).

shipped with ritual approaching in its main features that practised in orthodox Hindu temples.

To this belief, in my opinion, is to be traced the origin of the custom, still erratically and discontinuously distributed throughout Europe and Asia, of providing sailing craft with eyes. The custom was universally followed by the Greeks and Romans; no feature of these old vessels is more striking when one examines represer-

¹ A paper read before the Zoological and Ethnological Section of the Indian Science Congress, held at Bombay, January, 1919.

tation of boats upon Greek and Roman vases, coins, and triumphal friezes, than the continual recurrence of a well-defined *oculus* on each bow. The mariners of ancient Italy and Greece are credited with the belief that ships required eyes to see their way from haven to haven; it may well be that the common multitude held this crude belief in later days when confidence in the Old Gods began to weaken, when once-definite beliefs began to grow vague and formless, but in the beginning it is probable that religious import attached to its employment. This view is strengthened when we find that the ancient Egyptians, in days before Greece and Rome took shape, endowed with eyes the funeral boat wherein the mummy of the departed was ferried across the Nile to the tomb. These eyes, carefully depicted with well-defined conventionalized lids and eyebrows (fig. 30), symbolized the eyes of unseen Osiris who

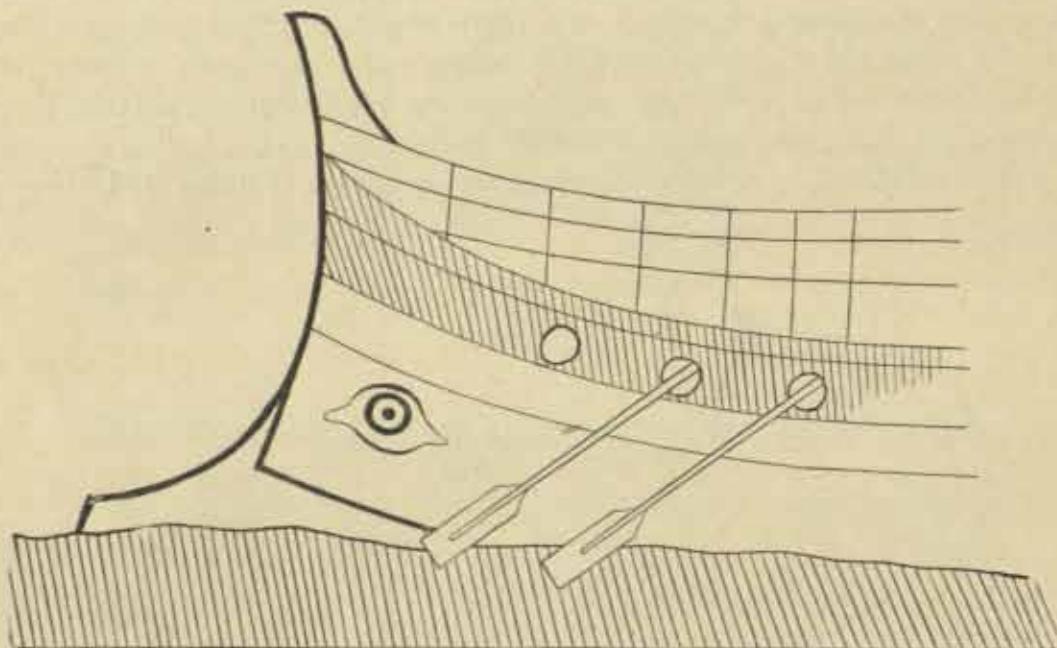


FIG. 31.—Fore part of a Greek galley from a vase in the British Museum; c. 500 B.C. (after Chatterton).

would eventually guide the bark of the dead to that other land not to be entered save by the aid of this deity and his shallop.

Except on these funeral boats the Egyptians do not appear to have used this eye symbol. The carefully drawn paintings of their sea-going vessels, such as the great sailing galleys employed by Queen Hatshepsut on her famous trading venture to the land of Punt, show no trace of it.

Neither to the river vessels depicted in Assyrian sculptures, unless it be merged in the eyes of the figurehead, but with the appearance of Greek and Roman ships in the Mediterranean the custom became common.

On galleys depicted upon Greek vases and coins, the oculus appears as early as 500 B.C. (fig. 31). From this time onwards the succession of eyed boats has been unbroken in Europe. During the days of Imperial Rome the symbol was equally commonly used as in earlier Greek times. For some reason, the custom died out in the

Middle Ages in the case of the large ships of commerce and war, except so far as the ship's eyes may have become incorporated with those of the figure-head of some patron saint; thenceforward its use was limited to the fishing boats and small coasting craft of communities that clung with more than usual tenacity to the customs of their forefathers. Such survivals at the present day are found among the boats of Portuguese fishermen,¹ the Xebecs of Calabria, the harbour craft of the Maltese, and occasionally among the fishing boats of the Sicilian and Greek coasts.

Going eastward we find few survivals among any people under Muhammadan influence.² Neither Arabs, Turks, nor Indian Muslims employ it; with them its use has ceased, doubtless from their appreciation of its association with religious beliefs other than their own.

In India and Ceylon it is wedded entirely with Hinduism; usually these survivals are in boats manned by Hindus of higher religious profession than is found on the average among boat people of this religion. The four instances known to me comprise a certain class of cargo-carriers found on the Ganges, the small Hindu-owned coasters of the north of Ceylon, the clumsy-looking *kalla dhonis* of Point Calimere over against Ceylon and the masula-boats of the Coromandel coast. The first named are clinkerbuilt boats used for heavy river traffic; they may be seen any day discharging stone and firewood alongside the ghauts at Benares.

The eye in these, is fashioned in brass; the opening of the lids elliptical, with angular ends; an eyebrow in brass surmounts the eye, the ends turned up abruptly and coiled (fig. 32). The design shows a marked approximation to that of the eye of Osiris painted on the Egyptian death barge (fig. 30) particularly in the presence and shape of the eyebrow. The hull of these Ganges boats is naked of paint save at the prow where a black area is painted; the eye is within this region. At the time of new moon (*amavasi*) a garland is hung from the stem-head, and worship (*puja*) performed at the bow—a ghee lamp is lighted, camphor is burnt, the sacred conch blown, coloured paste smeared on the prow, while libations and offerings of flowers, rice, and *pan supari* are made to the God whose protection of the boat and her crew is implored.

The second instance of the survival of the oculus, is in connection with the completion and launching of the curious surf-boats in use on the Coromandel coast for seine fishing and for loading and discharging cargo from vessels in the offing.³ These boats are constructed of planks sewn together with coir twine in order to give that elasticity without which they would break in pieces when grounding in their passage through the surf. When newly-built boats are first launched, elaborate puja ceremonies are performed connected with the worship of the sea-goddess Kanniamma, and one of the

¹ Chatterton, E. K., *Sailing Ships*, London (? 1909), p. 65.

² Pitt-Rivers, *The Evolution of Culture and other Essays*, Oxford, 1906, p. 225.

³ An apparent exception is seen at Chittagong and Rangoon, where the local Muhammadan boat-people employ a modification of the Chinese sampan in great numbers. The details vary somewhat from the original and the "eyes" are often put in very roughly as part of the general scheme of ornamentation adopted from the Chinese model. Among the Malays, "eyes" are also occasionally seen on boats, e.g., in a model from Selangor in the Indian Museum, No. 2764.

⁴ These are known to Europeans as "masulah boats" but as *padagu* among Tamils. The Malay term *prahu* is probably derived from the latter word.

rites is the incising, scratching, or daubing of the crude outline of an eye  on each bow (fig. 18, p. 174). This ceremony is termed "opening the eye" (*સુદ્રાષ્ટાનીધિ*). Some of the older men state that their idea in doing this is to endow the boat with life.¹ This custom is obviously related to that followed in the fashioning of metal and stone images of Hindu deities, where ritual prescribes that the putting in of the pupils of the eyes shall be the final touch put by the artist, indeed this is not done until just before the instalment or consecration of the image in its shrine. New brass and bronze images of gods sold from shops in Hindu towns are always blind; among strictly orthodox families the eyes should be "opened"—the pupil to be marked—before they are suitable for worship. Till then they are mere lifeless images without sanctity. When we find a similar custom of "opening the eyes" of a newly-built boat just before

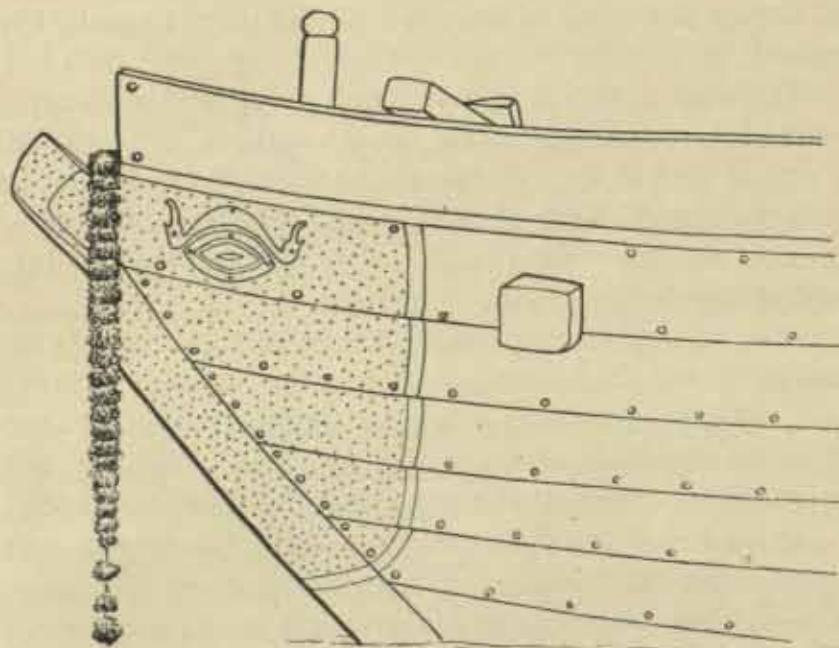


FIG. 32.—Bow of a Ganges cargo boat showing oculus in brass on a black ground and a garland hung from the stem. (Original).

launching, the fact clearly confirms my contention that the puja ceremonies are intended to instal a deity in the boat itself and to merge the boat's individuality in that of the goddess whose protection is sought. This idea is supported also by the lack of any subsequent attention to these eyes. Once they are opened, no further attention is bestowed upon them; in the course of a short time all trace of them disappears, the slight scratch made, becoming obliterated either by weathering or by the coat of paint or of tar sometimes applied to the top strake of these boats.

A most interesting survival of what I infer to have been originally a human blood sacrifice takes place after the puja ceremonies are completed; as the boat is launched down the shelving beach to take her first plunge through the surf, a pumpkin is placed in the way and the boat dragged over it, smashing it to pulp. The

¹ Others say it is done simply as an ornament, but this is said either from ignorance—old customs are dying fast—or from that peculiar reticence common the world over, regarding customs based upon superstitious beliefs.

pumpkin used is of a particular grey-coloured variety, well known in Tamil as *Kalyāna pūshini hai* as it is intimately associated with certain marriage ceremonies. Its preparation is significant; a piece is gouged out and through the opening thus made a quantity of powdered saffron and of vermillion powder (*தூஞிசூடு*) is dropped inside, the opening being reclosed with the plug of rind first cut out. The exterior is also sometimes daubed with the same two pigments. Now it is well known that a common practice in many countries in a primitive stage of civilization has been to offer up a human victim at the launching of vessels; the Vikings and the South Sea Islanders amongst others followed this custom. It may either mean the propitiation of a protecting spirit resident either in the boat herself or in the sea or it may be designed, as Grant Allen contends, to liberate a guardian spirit from the human victim, so intimately incorporated with the very planks and timbers of the boat as to become part and parcel of its fabric.

With milder manners and the influence of higher religious conceptions, domesticated animals were substituted for the human sacrifice; the gradation in India appears to have been first the ox or the buffalo, then the sheep, next the fowl and eventually, as we see in the instance now treated of, the refinement is reached of the employment of a vegetable. But even here, old custom exerts its influence, and the pumpkin has to be so treated that when smashed, some appearance of blood spilling may be shown. The fact that the bow of the boat during the puja ceremonies is also daubed with red spots as well as the pumpkin itself, corroborates this idea that the present-day ceremony is an emasculated simulacrum of the immolation of a human victim; they appear to represent the blood splashes spurted from the sacrifice as the boat lumbered over the body.

Still further and very conclusive evidence is furnished in the fact that the word used for this pumpkin-smashing ceremony is that for sacrifice in Tamil, *bāli* (බාලී). A similar use of a pumpkin filled with red and yellow powder is also employed in certain other sacrificial Tamil ceremonies unconnected with boats, but invariably associated with some deity who *dislikes animal sacrifices*. I should mention that Kanniamma, the sea-goddess, is one of these benevolent deities; the fishermen at Madras say that she would be displeased if sheep or fowls were offered as sacrifices to her. The pumpkin possibly represents the head of the victim. In the Moluccas a common type of boat of gondola-like lines has great upstanding ends, terminating in a ribbed sub-globular ornament which so reminded me of a pumpkin when I first saw it, that for want of a better name I termed these craft "pumpkin boats"; the idea occurred to me at the time that these ornaments were originally the heads of enemies—all the people of these parts were head-hunters till comparatively recent times. A well-known parallel to this boat-launching sacrifice is the belief current and persistent among Indian villagers that the Department of Public Works provides a human victim for the protection of any great undertaking it has in hand, particularly in the case of important river viaducts.

Of equal interest is the persistence of an eye upon either bow in the case of the archaic-looking *kalla dhoni* of the Tanjore coast (S. India). Until the comparatively

recent railway diversion of direct passenger traffic with Ceylon, these boats were very numerous and carried on a popular service between the little ports near Point Calimere and Kayts, the port of Jaffna, the northern capital of Ceylon.

The position of the eyes is the same as in the Ganges boats already described ; they are less elaborate, being incised upon the planking of the bows ; no eyebrows are indicated, merely a conventional eye bounded by elliptical lids. The pupil is shown elongated. On the starboard bow, the eye is followed by a small square containing the name of the patron goddess of the village—in the cases noted *Ammai*—surmounted by the Hindus' propitiatory sign of *u*, *paravi* (परवि) or "horse" being added, evidence of the dedication of the vessels to the goddess honoured, as her horse or vehicle (fig. 13, p. 168).

In Kodakarai, the village goddess, Mari Amman, is the one held in special esteem by sailors and fishermen. Her temple was accounted very rich in the days of constant trade communication between this village and Ceylon, the tindal or master of each boat giving a rupee to the temple for each voyage safely accomplished. In danger or storm the local seamen are still accustomed to call upon her for help, shouting their appeal, *Amma! Amma!* and vowed offerings of money if they reach shore safely through her intervention. Usually the money vowed is tied in a cloth and nailed to the mast there and then.¹ A Brahman officiates as pujari in her temple. With the imposition of quarantine rules and the concentration of coolie emigration to Ceylon, first through Tuticorin and then through Mandapam, the lucrative passenger trade of these kalla dhonis collapsed and little money now flows to the temple coffers as the pujari sorrowfully complained to me.

In passing it is worthy of remark that, very generally in India, the protecting deity of sailors and fishermen is feminine. The instance just given is one ; I have seen another on the Gujarat coast where the local female deity of the harbour they happen to be fishing from, is worshipped in set form at stated times and her assistance and protection implored, while at Madras the protection of Kanniamma, a sea-goddess, is invariably sought both at launchings and during tempestuous weather—the latter is believed to be a token of her anger. By this common association with a female deity, the identity and sex of the protectress would merge eventually with that of the boat itself ; as we may infer that other races have reasoned and acted similarly, this becomes a sufficient explanation for the fact that ships are considered feminine in Europe and especially in England.

The fourth instance of the use of eyes in the Indian region is from the adjacent coast of Ceylon, in certain boats belonging to Hindu owners. These craft, hailing from Valvettithurai and the neighbouring small ports, generally called Jaffna dhonis by Europeans, are known as *padagu* in Tamil. They are antiquated craft quite distinct in build and rig from the Kalla dhoeni. They are rigged as two-masted schooners, distinguished from other local types by the enormous development

¹ Cf. the custom of placing a silver coin under the mast in fishing boats on the east coast of England at the present day !

of jibs and foresails, whereof they carry five. The eyes in these boats are boss-like, carved separately out of wood, and nailed in their place one on each bow. The iris is painted black, the eyeball white, an outer black margining outline representing the eyelid (Pl. VI, fig. 2). Even among the Hindu-owned, the use of the eye is not now universal; the custom is gradually dying out and in a generation or two will have disappeared.

Besides those owned by Hindus, a number belong to Muhammadans. None of the latter are furnished with eyes and they are further distinguished by the form of the stem-head. In the Hindu boats this takes the shape of an inwardly coiled rounded ornament, the *surul* (Pl. VI, fig. 2); the jibboom is placed eccentric upon the starboard side. In the Muhammadan variety, the jibboom is fixed in the median line and the stem piece is prolonged forwards as a bowsprit to support the jibboom.

In most of the Hindu *padagus*, particularly those adorned with eyes, the fore-part of the bows is sacred; it forms the ship's particular shrine and place of worship. The crew are usually orthodox Saivites, so the aft edge of the *surul* is painted with the three horizontal bars associated with the deity who receives their primary devotion (Pl. VI, fig. 1). In the recess below is a little shelf a few inches above the deck; on this, when I visited one of these vessels, was a blowing conch and the lamp used in the ceremonies. When worship is to be performed, usually before leaving port, one of the crew who acts as *pujari*, puts ash on his forehead, lights the little ghee lamp lying on the shelf, burns camphor and incense, breaks a coconut, and rings a bell, while an assistant blows intermittently upon the conch. Offerings of plantains, betel leaves and arecanuts are made to the god and then distributed among the crew.

When questioned the tindal would not admit that the eyes on the bows had anything to do with the god under whose protection they sailed. He explained their presence and use as the Greeks and Romans did and as the Chinese do now—that the eyes were there to enable the ship to see her way, to avoid rocks and sandbanks—in his words "without the eyes she would be like a blind man alone in the street." But that this was the original reason for placing the eyes, I feel sure is not the case; it is the general custom among the uneducated or partially educated classes to disclaim the connection of any custom they practise, with anything that savours of unorthodox superstition. For instance, a man will place the impress of a hand upon the door of his house or will tie some object around the neck of his milch cow and in spite of the transparently obvious motive, he will often stoutly deny that it meant for anything but fancy or ornament. Apart from this reason, we have to remember that the general employment of such a custom dates back so far into the past, that the original significance may well be lost, obscured, or transformed. We have also to allow for the hazy and vague ideas that the uneducated have of the fundamental reason or meaning of many of the customs they practise; with almost all, the sole valid inducement is the immemorial usage of their caste or calling or country. From a survey of the little we know of the subject, and by inference from the association of all the four Indian instances with special and specific religious observances, and above

all the linking of the oculus with the name of the goddess in the case of the kalla dhoni, we must draw our conclusions. Just as there is in India a presiding or protecting deity in each Hindu house, so in these four boats we have what cannot well be other than a survival from the days when the ceremonies attendant upon the launch of every boat in India endowed it with a presiding god or rather goddess, in whose care the vessel and her crew should thereafter be; as the house deity is associated in special measure with the entrance or threshold, so the guardian of the boat appears to be associated more particularly with the bow. Many Indian sea-customs tend to confirm this view of the sacredness of the bow and its association with the protecting deity—among others that may be mentioned is that of splashing water upon the prow when a fishing boat pushes off from shore; this is practised by the Roman Catholic fishermen of the Tinnevelly coast and it most certainly conserves for us an extremely old custom of offering libation to the boat's presiding deity.¹

Any indignity to the bow of their boat is resented by the Hindu boat-people of the north of Ceylon as shown by the following incident. One of my assistants, when on a journey in a Jaffna dhoni, happened to sit upon the stem-head, carved as usual into a inwardly coiled ornament. The tindal was greatly annoyed at this, although my assistant was a Brahman; he ordered him to get off, telling him he should not sit there as the bow was Lakshmi, and such action was offensive to the goddess. In explanation he subsequently stated that the bow is held sacred among Jaffnese Hindu sailors, consequent upon the special religious cremonies performed at the launch of the boat. The tindal described these as follows:—

Before the boat is put into the water, it is decorated with flags and plantain trees and a garland of flowers is hung round the prow, which is also smeared with sandalwood paste and vermillion powder. A small coloured "cloth" such as is worn by young girls is also wrapped round it; finally a *tali* or marriage token in the form of a small brass cup or bowl is tied round the same part exactly as a token of similar form but fashioned in gold, is tied around a bride's neck during orthodox Hindu marriage rites. The ceremonies appear intended to wed Lakshmi to the boat and instal her there permanently. The brass *tali* used at the launching is a cherished possession of the boat-owner and is handed down from father to son. Hindu boatmen in the north of Ceylon are now few in number, and the above custom is rapidly dying out.

Regarding the antiquity of the above practices and beliefs, it is of importance to note that the Jaffnese Tamils, long resident in the north of Ceylon as descendants of emigrants and invaders from the Chola and Pandyan kingdoms of South India, have retained many archaic Tamil customs long since lost by their continental kindred; they are noted also for employing in ordinary speech a form of Tamil which they claim closely approaches the classical Tamil of 1,000 to 1,500 years ago. If true,

¹ An interesting account of the belief held among the Malay fishermen of Patani that all boats have a 'oul,' is given by Dr. N. Annandale in *Fasciculus Malayensis* (Anthropology, Pt. I, 1903, p. 80). After a spell of bad luck in fishing, an offering is laid on the head of each rib of the boat. Some fishermen also make a practice of placing 'turmeric rice' on the prow of their boat every Friday, with the same object.

as is probably the case, the inference follows that their local vessels may be expected to retain more marked archaic characteristics than those of ports more open to outside influence. The same deduction may be drawn regarding the Point Calimere *kalla dhonis* which are employed solely in traffic with the north of Ceylon and whose crews are closely related in origin, caste and customs with the men who man the Jaffna *dhonis*. Both are above the average in religious zeal, and aspire to be considered much higher in caste than the ordinary run of coast fishermen and sailors.

Other evidence of the ancient character of the custom is obtained from the frescoes in the Ajanta caves (Hyderabad), dating about 600 A.D. Among these are depicted a three-masted ship and a royal barge, both provided with eyes on the bows.¹ Similarly the Buddhist sculptures of Boro Budur in Java, belonging to the 8th and 9th centuries of our era, include one of a two-masted ship furnished with eyes; in this however the eyes have the unique peculiarity of being situated both on the bows

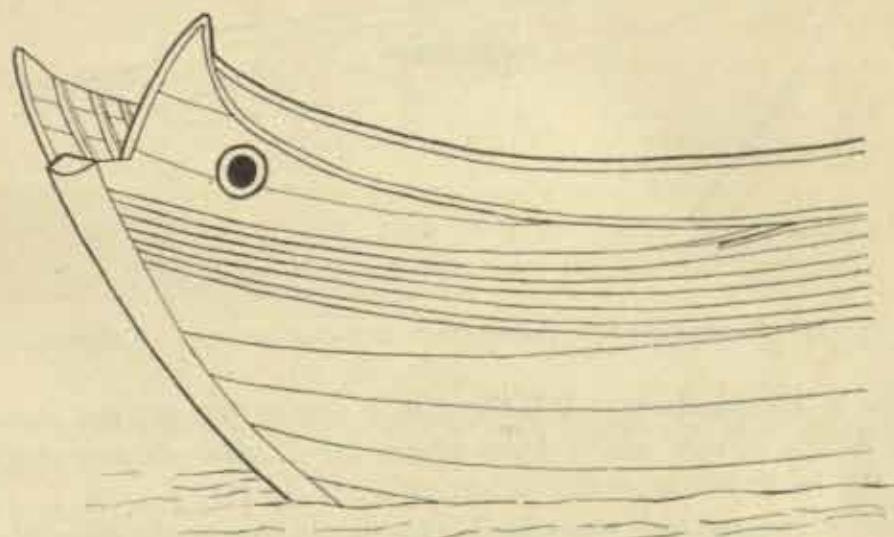


FIG. 33.—Oculus of boss-shape, on the head-boards of a Chinese junk, Shanghai. (Original).

and on the quarters—two pairs (fig. 29). This boat, like nearly all those depicted in these sculptures, is provided with outriggers, and it is possible that eyes at both ends is a reminiscence of the early days when boats provided with outriggers had no definite prow and stern, and sailed indifferently either end forward, according to the direction of the wind. If "eyes" were in use at this stage of eastern boat evolution, we may be sure there was one pair at each end. But it must be noted that only one of the several instances of boats and ships represented in the Boro Budur sculptures, show evidence of the use of "eyes." Even so early the custom had ceased to be habitual.

Eastwards from India, the principal peoples who employ the oculus are the Chinese and the Annamites; among them the custom flourishes, indeed only with them throughout the whole world is the custom habitual and universal. The exceptions where no

¹ Mukerji, R., *Indian Shipping*, p. 41.

eyes adorn Chinese craft, large as well as small, the ocean junk equally with the sampan, must be extremely few ; I do not remember seeing one without. And the Chinese boatmen and fishermen when they emigrate to the Straits Settlements and the Dutch Indies adhere to the custom ; even so far west as Rangoon, Penang and Singapore, the ubiquitous sampan greets the traveller with fixed stare from protuberant eyeballs.

The Chinese and the Annamite oculus show peculiar differences. In the former, each eye is circular, the dark or black centre, representing probably the pupil and iris combined, large and protuberant, encircled by a band of white (fig. 33). No attempt is made to impart an air of realism ; the object is wholly conventionalized, and a most

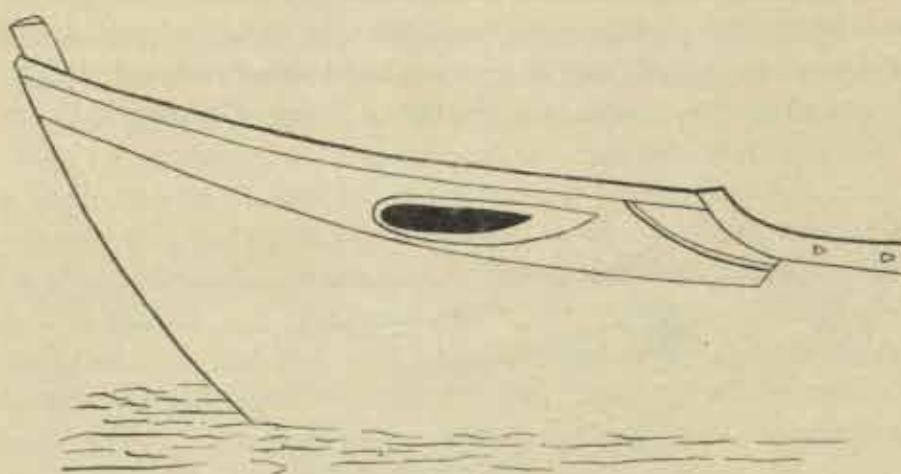
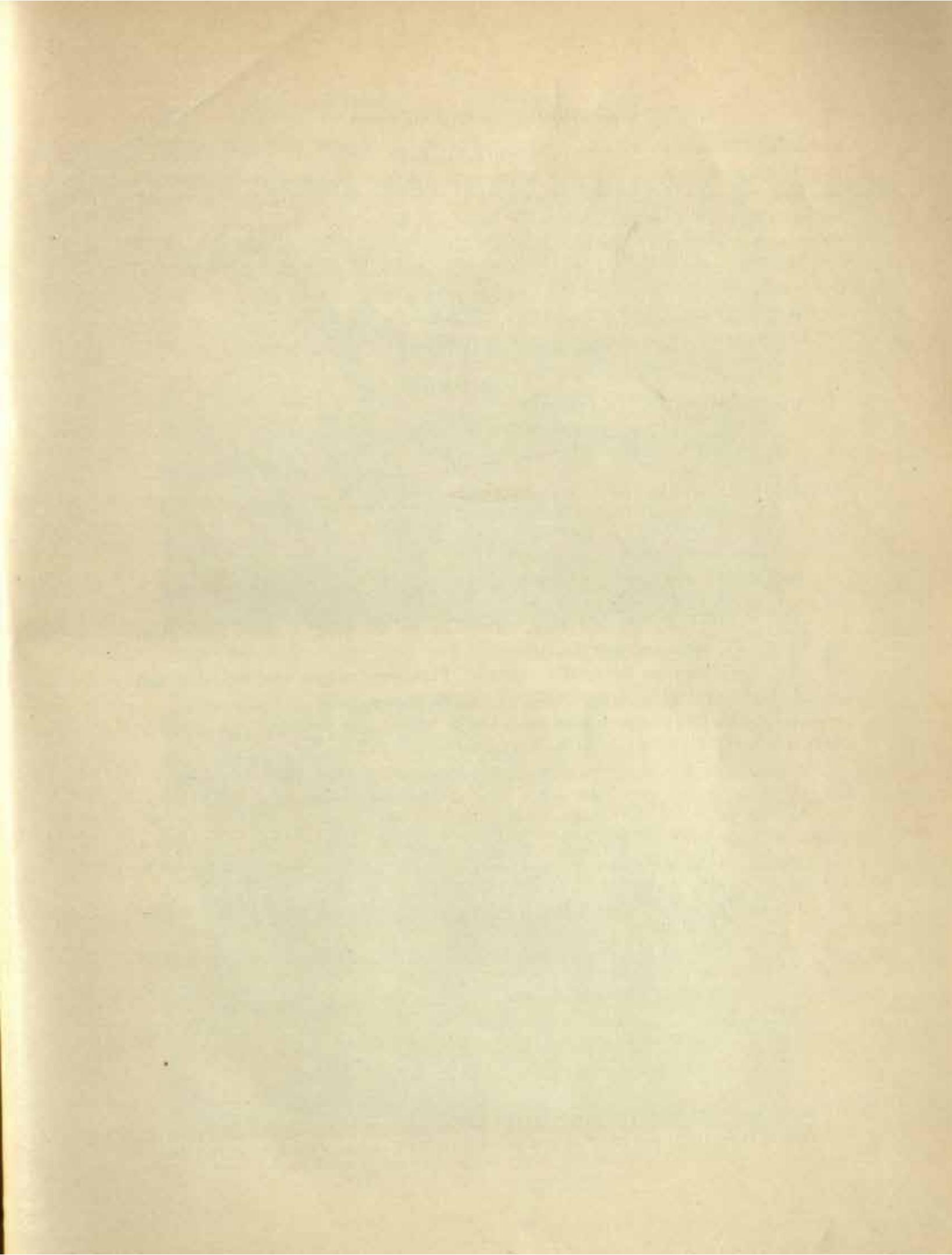


FIG. 34.—Elongated oculus characteristic of Annamite boats. (Original).

curious feature is the roundness. Whether this is due to the original design having been circular in the foreign source from which the Chinese adopted this custom or whether it is the result of convention is impossible to decide.

In Annam, on the contrary, where boats are equally commonly endowed with eyes, they are neither round nor of boss form ; they are painted on the flat of the bows and reproduce in some degree the almond outline of the Mongolian eye. The degree of elongation varies greatly ; it begins as a slight lengthening of the aft side of the circle and through all degrees passes to an extreme where it becomes an exaggerated oval with its length fully five times the vertical height (fig. 34). As in Chinese boat-eyes, the pupil and iris are represented in black upon a white ground.



EXPLANATION OF PLATES.

PLATE I (Frontispiece).

FIG. 1.—Parawa fisherman of Tuticorin. Cephalic index 82.16. Type of features distinctly Polynesian.
,, 2.—Stern view of two large river boats on the Ganges at Benares. Hulls clinker built; rudder of balanced type with long shaft and tiller.

PLATE II.

FIG. 1.—Arab dhangi showing sharp stern and colour scheme.
,, 2.—Arab baggala showing square stern and quarter projections.

PLATE III.

FIG. 1.—A kotia outward bound.
,, 2.—Stern of a Kutch kotia.

PLATE IV.

FIG. 1.—A battela with boat rigged out as counterpoise.
,, 2.—A large pattimar from Malwan.

PLATE V.

FIG. 1.—A cargo lighter, Tuticorin.
,, 2.—A Tuticorin fishing canoe.
,, 3.—Tuticorin spread-canoe, hauled up on the beach. Note their great beam and graceful lines.
,, 4.—Mangalore backwater lighters. Penthouse cadjan roof to cabin and primitive square sail.
,, 5.—A two-masted fishing boat, Chilka Lake.
,, 6.—Small coracles on the River Bhawani, S. India.

PLATE VI.

FIG. 1.—Fore end of deck of a Jaffna dhoni; puja to Siva being performed. Note Saivite symbol on coiled stem-head surul. The pujari holds a brass tray of offerings in one hand and a bell in the other; his assistant is blowing a conch.
,, 2.—Bow of the same vessel, showing a boss-shaped oculus nailed to the planking.
,, 3.—Fore end of a kalla dhoni, Pt. Calimere; an eye and the words *Ammaiparavi* incised on the bow. Note the rude conventionalized representation of yellow garlands painted on the sides of the stem.
,, 4.—Bow of a Ganges cargo boat, decorated with an elaborate oculus fashioned in brass and with a garland hung round the stem head.

All figures except those of Plates II, III and IV are from photographs by J. Hornell.

Those of Plates II, III and IV are by kind permission of the Chairman of the Bombay Port Trust.



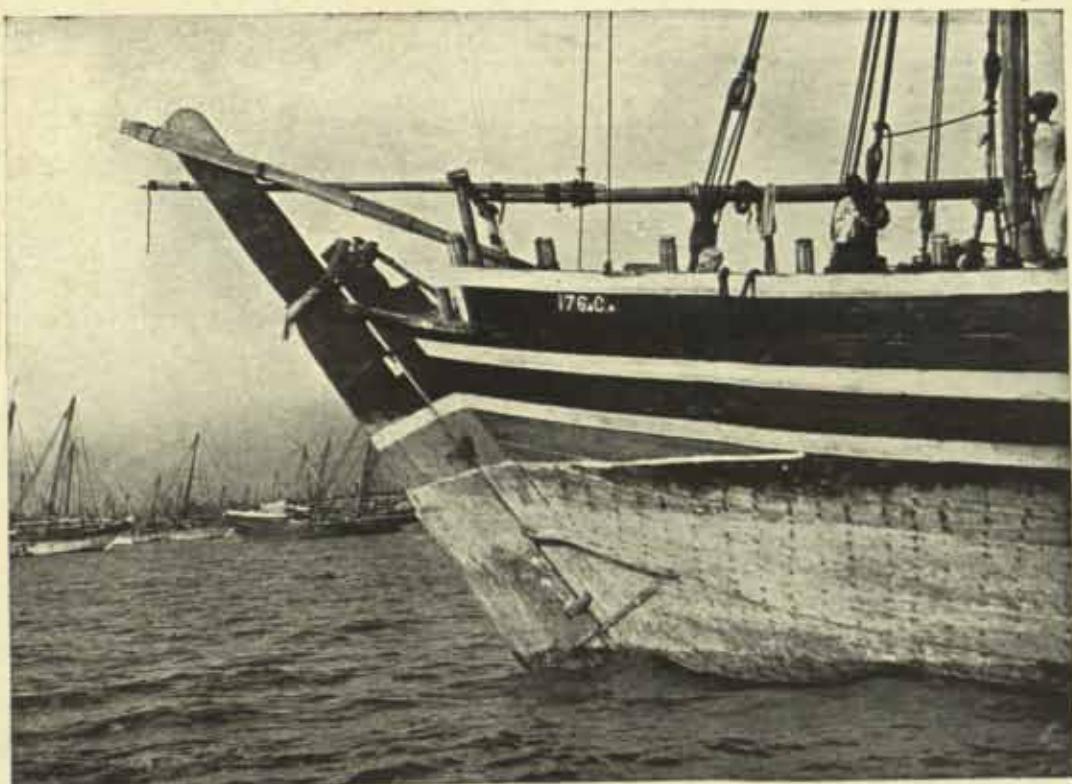


FIG. 1. ARAB DHANGI SHOWING SHARP STERN AND COLOUR SCHEME



FIG. 2. ARAB BAGGALA SHOWING SQUARE STERN AND QUARTER PROJECTIONS.

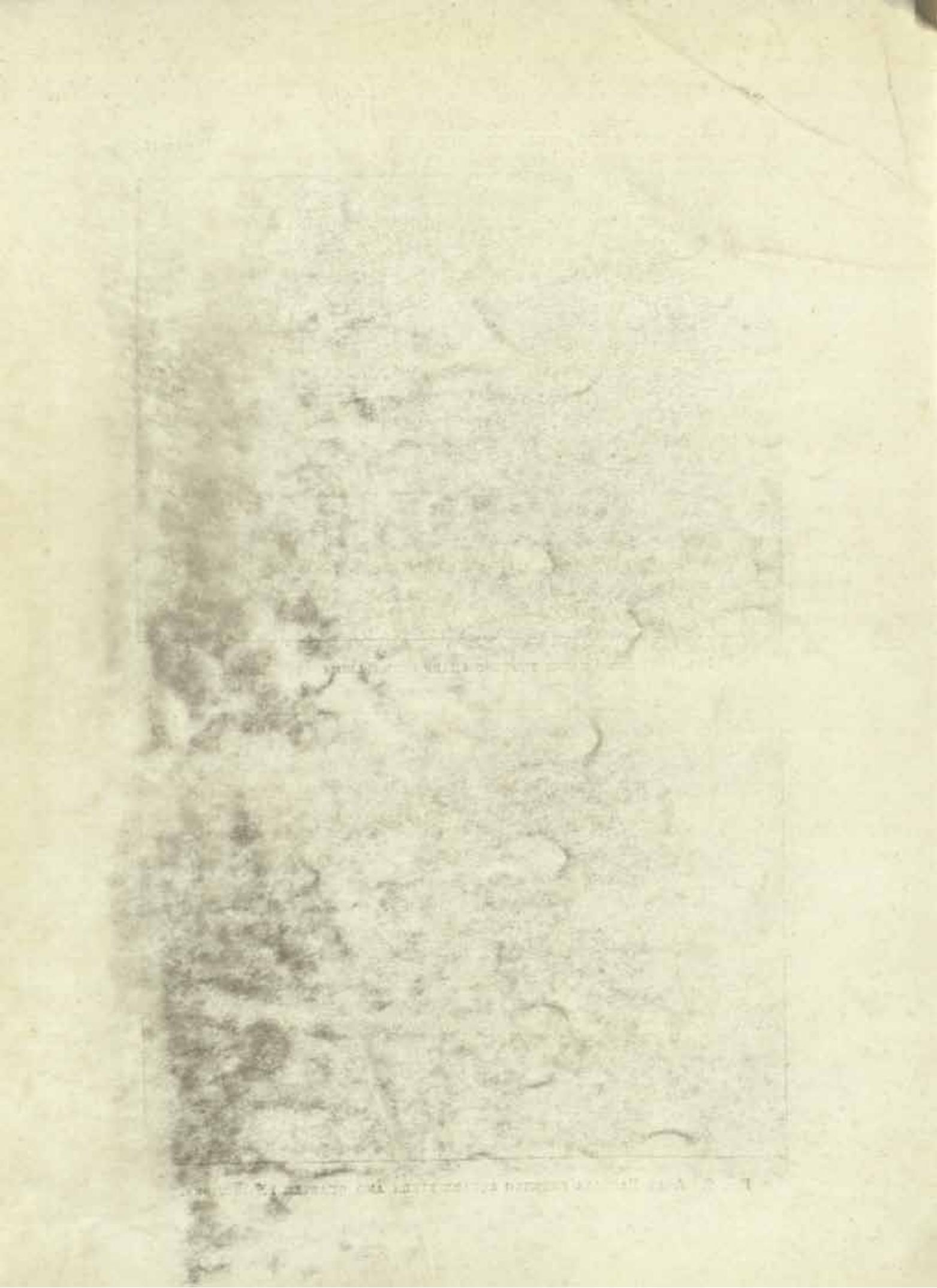
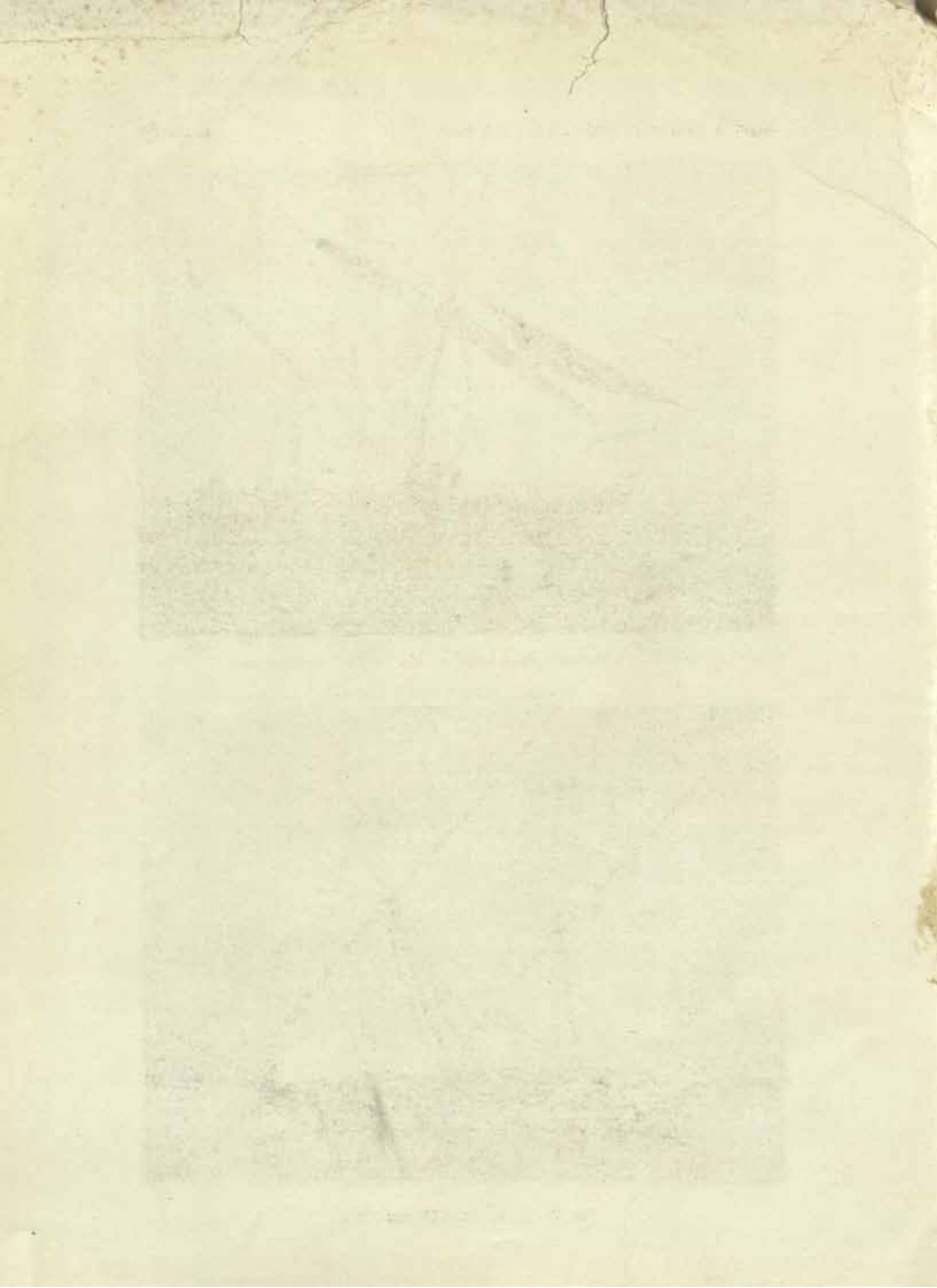




FIG. 1. KOTIA OUTWARD BOUND.



FIG. 2. STERN OF A KUTCH KOTIA.



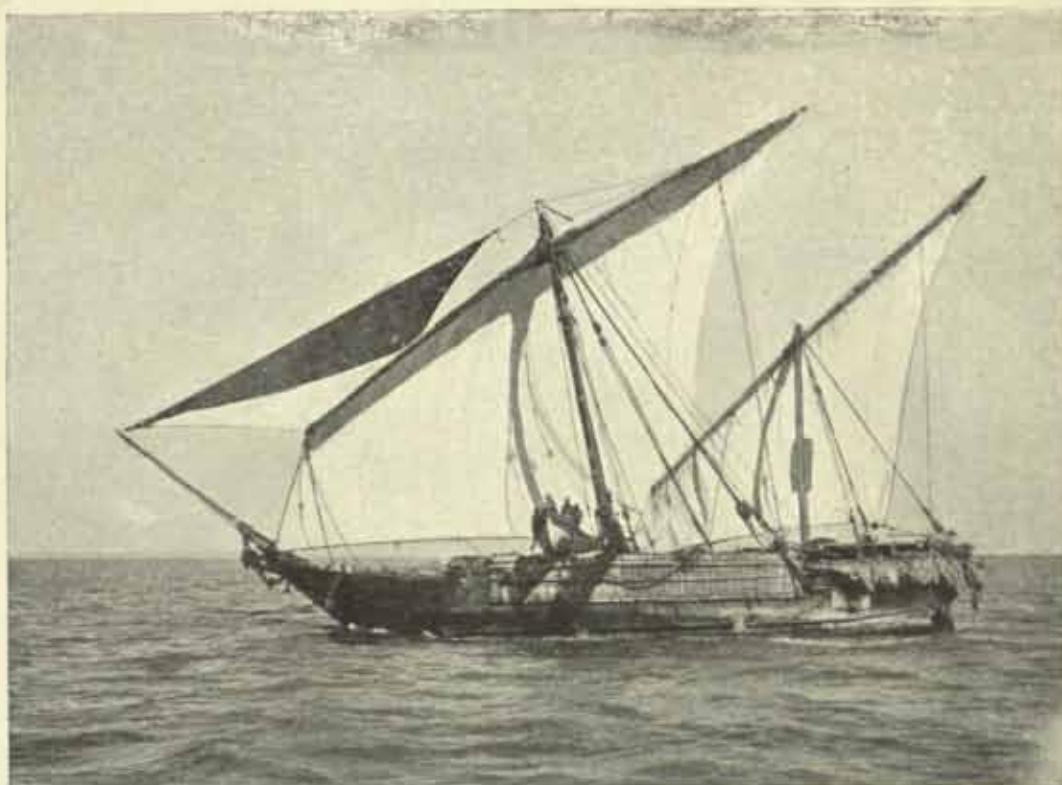


FIG. 1. A BATTLEA WITH BOAT RIGGED OUT AS COUNTERPOISE.

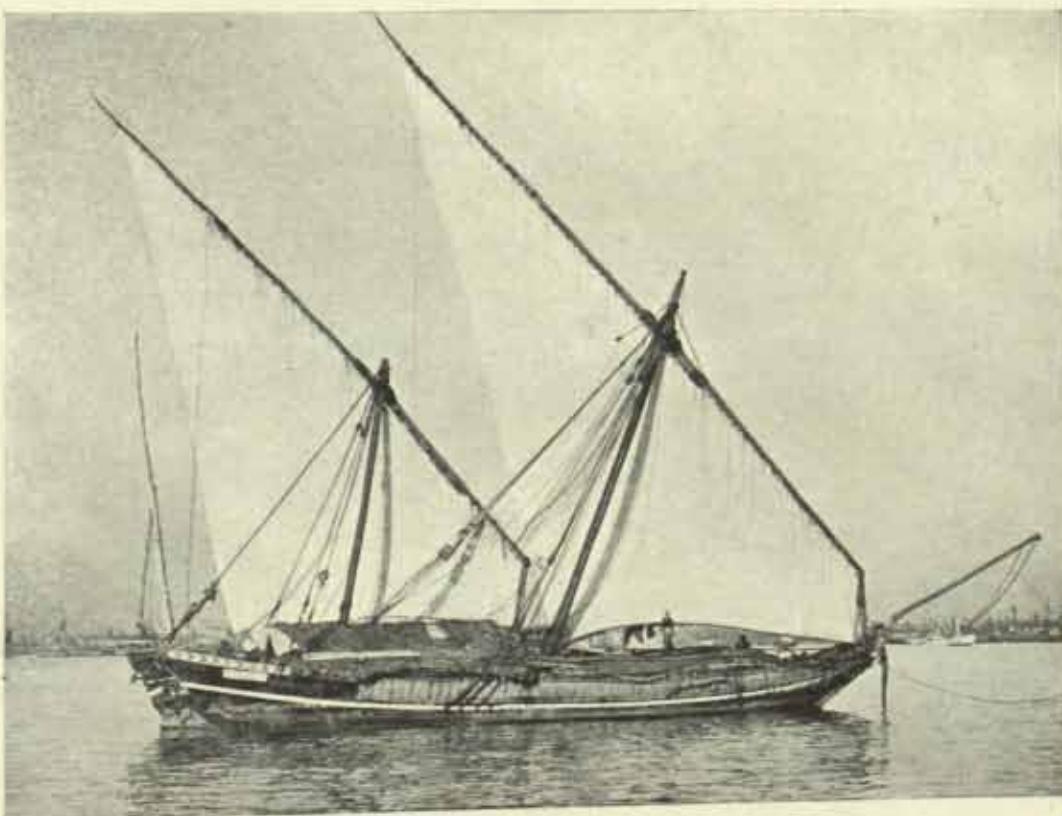
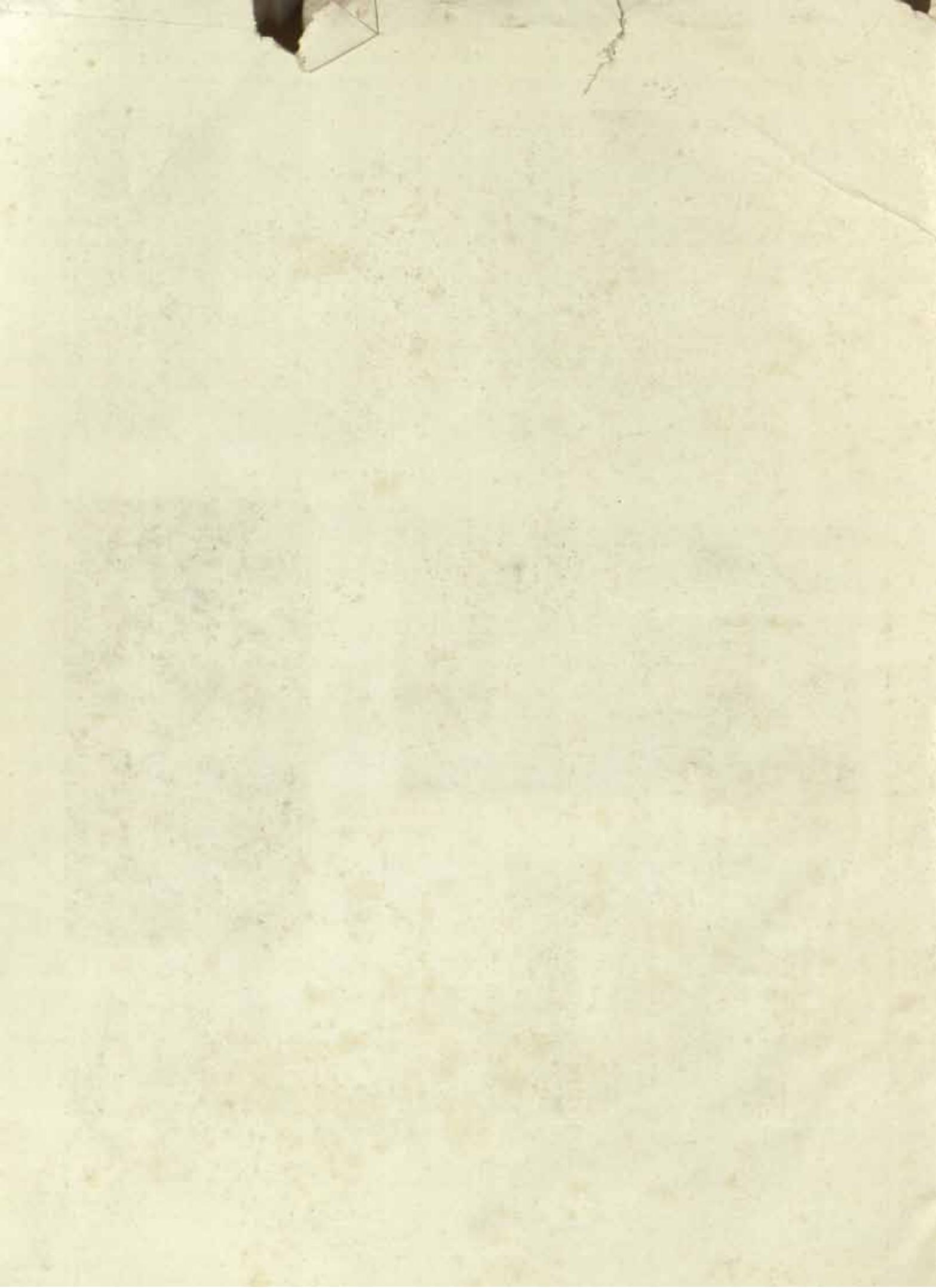


FIG. 2. A LARGE PATTIMAH FROM MALWAN.



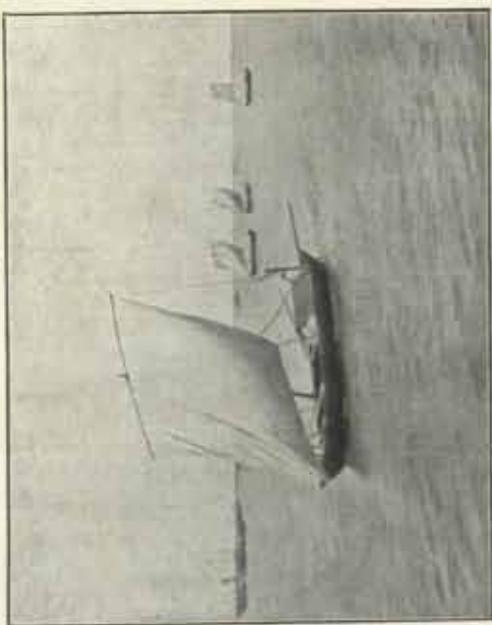


Fig. 4. Mangalore backwater cargo carriers.

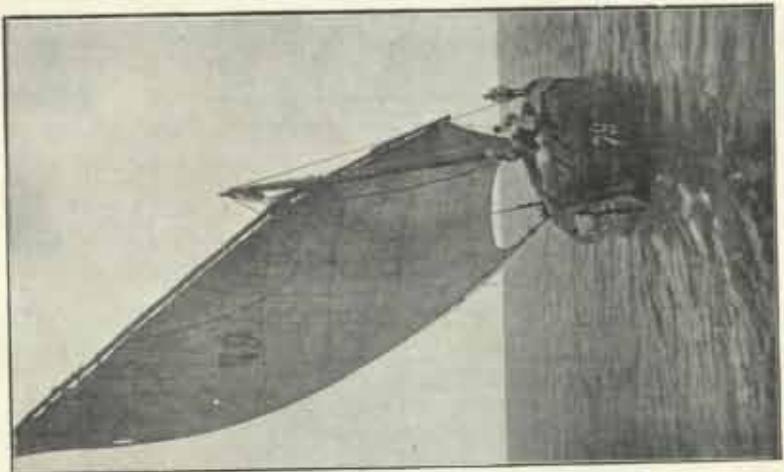


Fig. 1. A cargo lighter, Tuticorin.

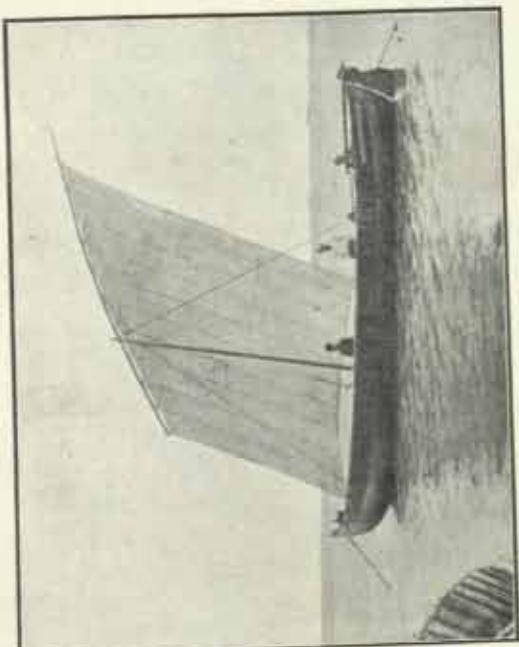


Fig. 2. A Tuticorin fishing-canoe.

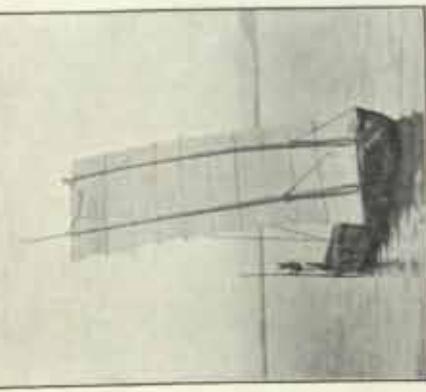


Fig. 5. A two-masted fishing bont, Chilka Lake.



Fig. 6. Small coracles on River Bhawani, South India.



Fig. 3. Tuticorin spread-canoe.

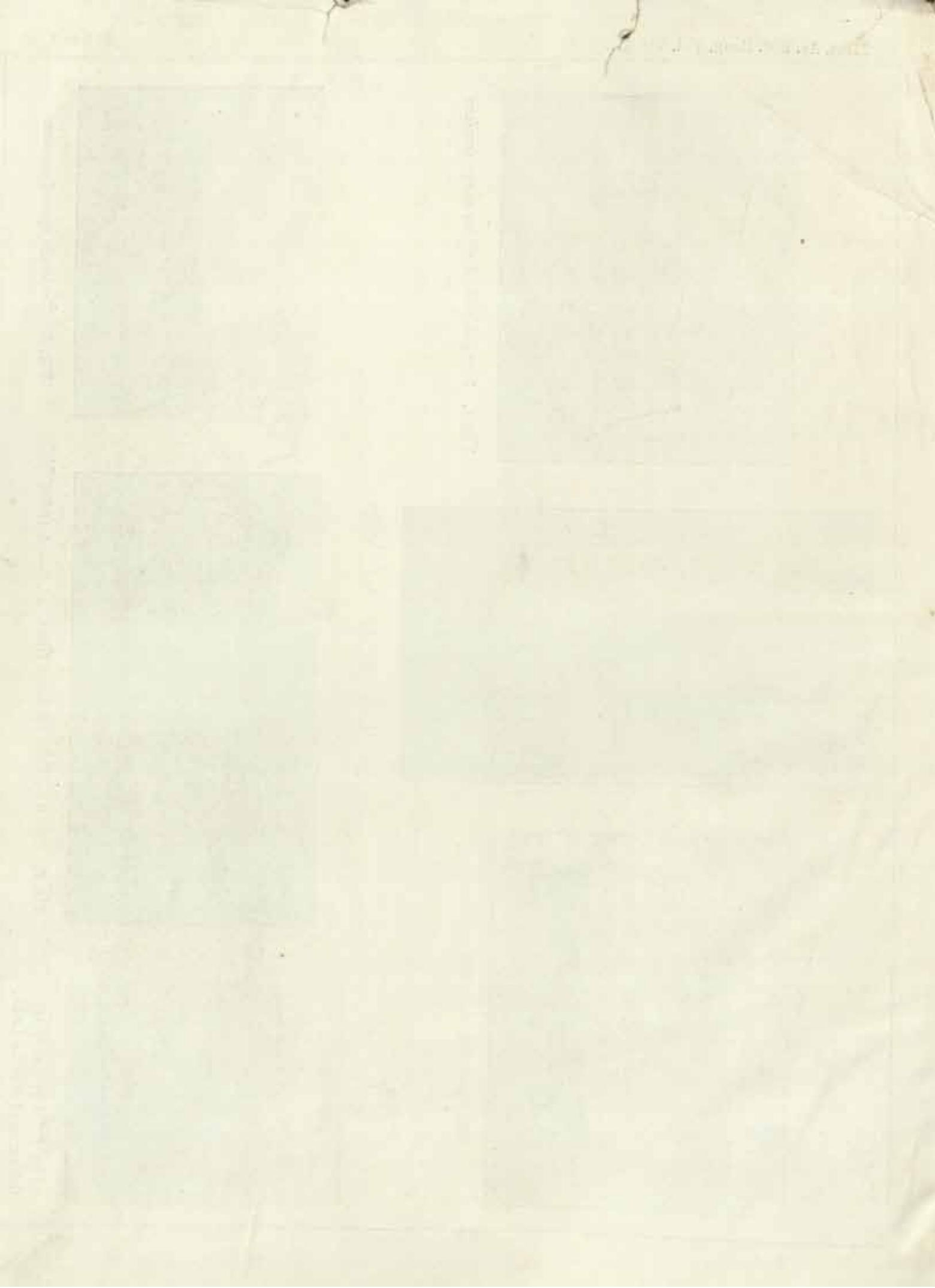




Fig. 3. Stern and bows of a Knall dhoni, Pt. Calimere. The oculus incised.

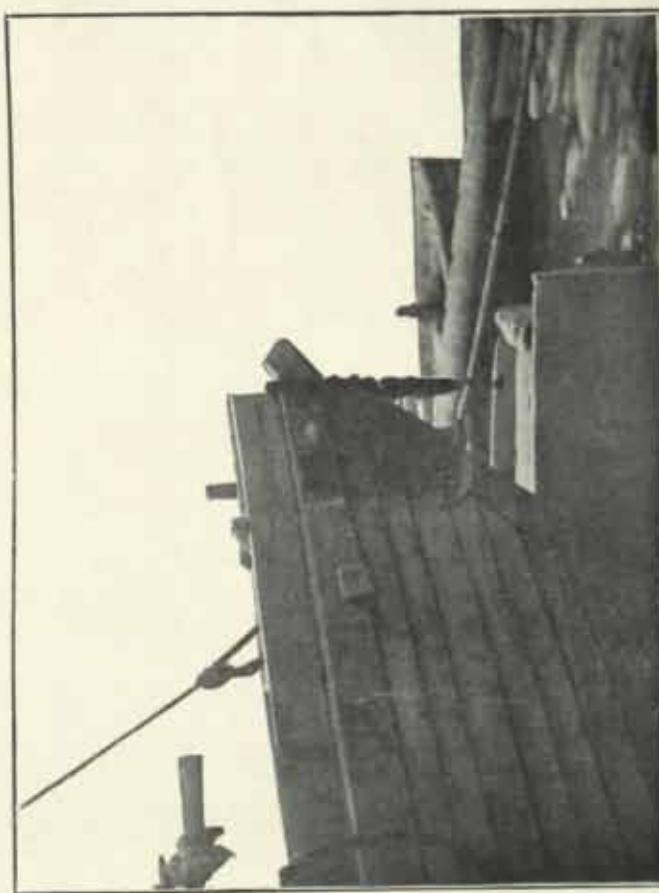


Fig. 4. Fore end of a Ganges cargo-boat, Benares, showing an "eye" in brass.



Fig. 1. Puja to Siva being performed aboard a Jaffna dhoni.

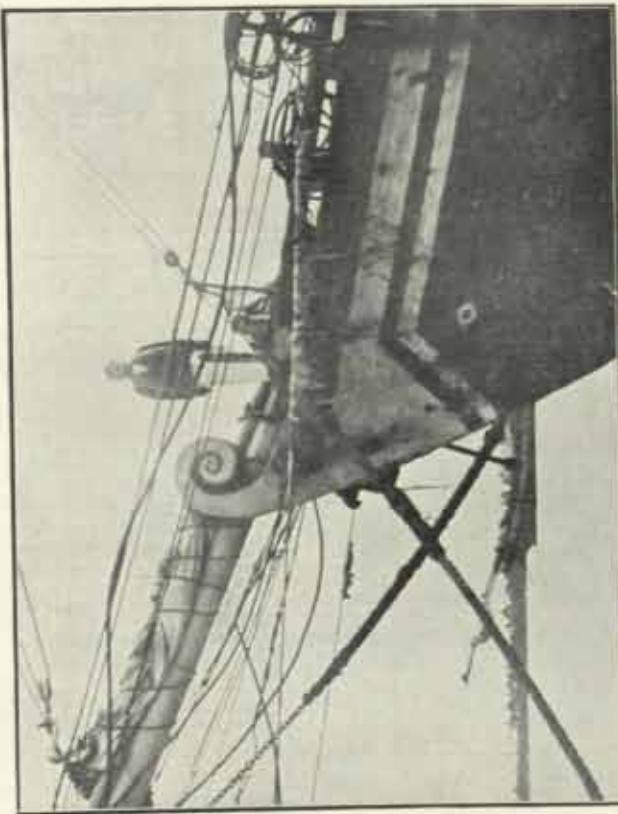
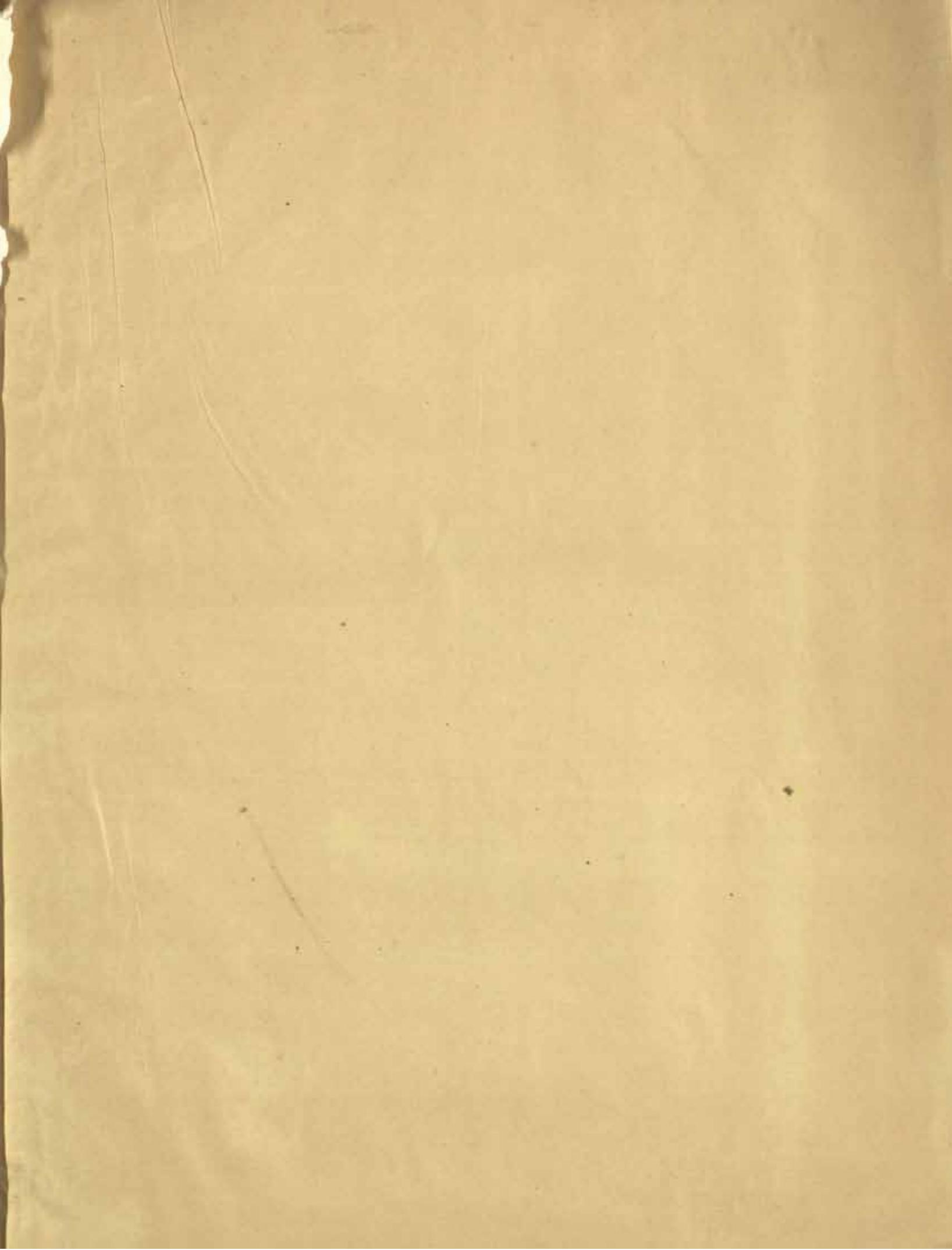
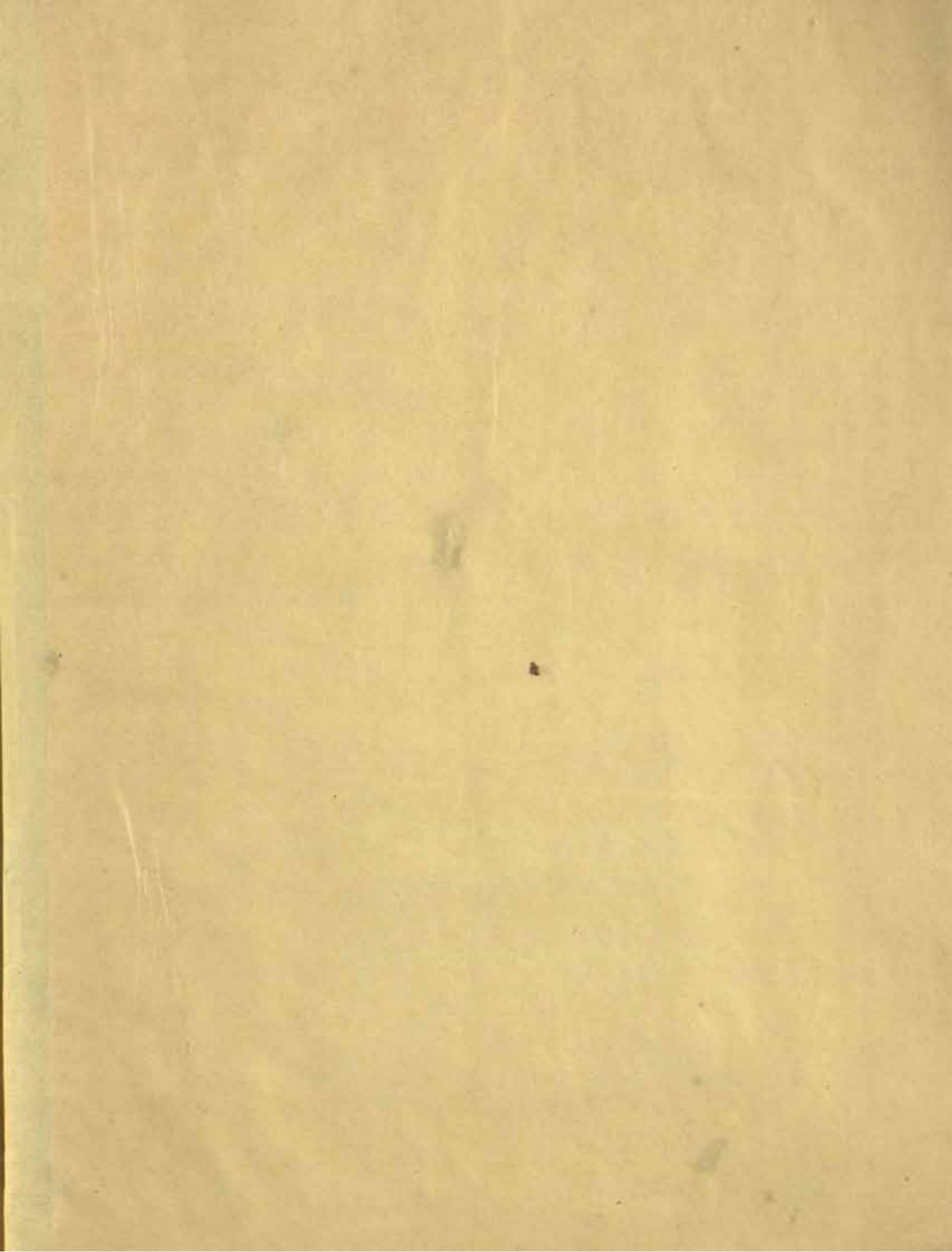


Fig. 2. An "eye" milled to the bow of a Jaffna dhoni.

From photographs by J. Hornell,







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